



2009 Air Quality Updating and Screening Assessment for Plymouth City Council

In fulfillment of Part IV of the Environment Act 1995
Local Air Quality Management

April 2009





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Executive Summary

The purpose of the 2009 Updating and Screening Assessment (USA) is not to undertake a fundamental review of air quality but to consider whether there have been any changes to emissions or whether new sources or receptors have been introduced, which might lead to a risk of an air quality objective (set out in Table 1.1) being exceeded.

The report proforma and checklist, produced to support the USA, was used to identify any significant changes. Detailed consideration was also given to the latest air quality monitoring data and the potential for development growth to influence local air quality levels.

The 2009 USA was carried out according to the latest guidance issued by DEFRA 'Local Air Quality Management Technical Guidance' LAQM TG (09). The USA finds that all the air quality objectives listed in Table 1.1 will be met by the relevant deadlines, with the exception of Nitrogen Dioxide (NO₂) where exceedances of the 2005 limit value are occurring and likely to recur in the two existing Air Quality Management Areas for NO₂ which were declared in May 2005. There are three further areas identified that regularly exceed the objective for NO₂ that need to proceed to detailed assessment which are submitted separately to this document. All three new areas are major traffic routes in and out of the city, which have experienced increased volumes of road traffic. All three areas have residential properties in close proximity to the roadside at relevant exposure locations.

New monitoring data has confirmed the findings from the 2008 Progress Report (PR) that the concentrations of Benzene at the location of relevant receptors within the Benzene AQMA have fallen dramatically and therefore supports the conclusion that, following the submission of a detailed assessment, the AQMA should be revoked.



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Nomenclature

AADT	Annual Average Daily Traffic.
AQMA(s)	Air Quality Management Area(s).
AURN	Automatic urban and rural network.
CO	Carbon monoxide
DMRB	Design Manual for Roads and Bridges.
HDV	Heavy Duty Vehicles
LA	Local Authority
LAQM TG (09)	Local Air Quality Management Technical Guidance 2003.
mg/m ³	a measure of the concentration of a pollutant in milligrams per Cubic meter (of air).
NO	Nitric Oxide
NO _x	Nitrogen Oxides
NO ₂	Nitrogen Dioxide.
PM ₁₀	Particulate Matter (less than or equal to 10 micro-meter).
SO ₂	Sulphur Dioxide
TEOM	Tapered Element Oscillating Microbalance.
ug/m ³	a measure of the concentration of a pollutant



1. Introduction

1.1 Description of Local Authority Area

Plymouth has a population of nearly 255,000 and is the largest city in the South West. As well as being a prime tourist area, it is also a large naval port. The bulk of the city lies on a peninsula of land between two rivers, the Tamar to the west and the Plym to the east. The city is bounded to the north by Dartmoor and is surrounded by smaller conurbations, housing many of the employees for the city. The surrounding Local Authorities have smaller populations but are much larger in geographical areas. The neighbouring Local Authorities include the South Hams to the east and the newly formed unitary Cornwall Council to the west, as shown in Figure 1.1 below.

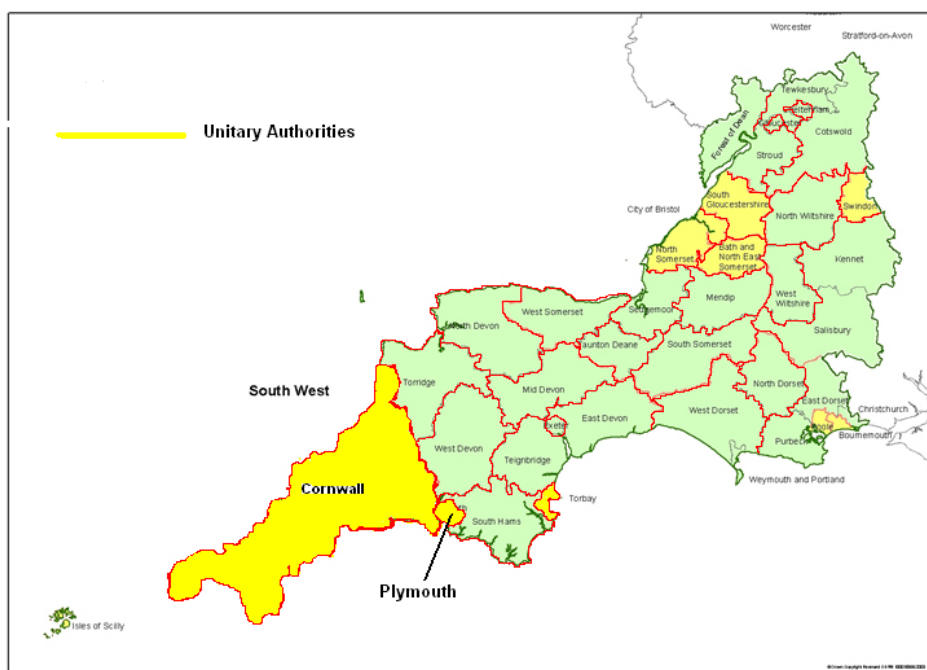


Figure 1.1 Local Authorities Surrounding Plymouth.

Plymouth is currently undertaking a massive project of urban redevelopment, the largest since the city was rebuilt after the Second World War. The 'Vision for Plymouth' launched by the internationally renowned architect David MacKay, and fully backed by Plymouth City Council, is set to see areas of the city centre demolished, redesigned and rebuilt by the year 2020. The major sources of air pollution include Part A & B processes, the rail network to London, the airport, shipping, dockyard, and several major road networks. Regular meetings take place between representatives from each of the Local Authorities within Devon to discuss issues that affect neighbouring Authorities, for example air quality and new or substantially changed industrial processes.

1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management (LAQM) process as set out in Part IV of the Environment Act 1995, the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. The LAQM process places an obligation on all Local Authorities to regularly review and assess air quality in their areas and to determine whether or not the air quality objectives are likely to be achieved. Where exceedances are considered likely, the Local Authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in England are set out in the Air Quality (England) Regulations 2000 (SI 928), the Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1.1 below. This table shows the objectives in units of microgrammes per cubic metre ($\mu\text{g}/\text{m}^3$) (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedances in each year that are permitted (where applicable).

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
	5.00 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
	0.25 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2005
Particles (PM ₁₀) (gravimetric)	50 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
Sulphur dioxide	350 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

Table 1.1 Air Quality Objectives included in Regulations for the purpose of Local Air Quality Management in England.

1.4 Summary of Previous Review and Assessments

1.4.1 Updating and Screening Assessment 2003

This report recommended that detailed assessments were required for: -

- Exeter Street – Benzene and NO₂
- Plymouth Road – NO₂
- Mutley Plain – NO₂
- Victoria Wharves – PM₁₀ (a busy dock where loading/unloading of dusty cargo occurs)

Concern was also expressed about Plymouth Railway Station, but after further investigation, guidance issued to drivers enforces that engines are switched off after 10 minutes. An electrical shore supply is provided for use for all trains for use when the time of engine running is likely to exceed 10 minutes, or during extremes of weather. Therefore, there was no need to proceed to a Detailed Assessment for this. The results of the 2003 USA are shown in Table 1.2 below.

Pollutant	Updating and screening assessment	Declared AQMA, monitoring continuing	Further monitoring required outside an AQMA	Detailed Assessment required
Carbon monoxide	✓	X	X	X
Benzene	✓	X	X	✓
1,3-butadiene	✓	X	X	X
Lead	✓	X	X	X
Nitrogen dioxide	✓	X	X	✓
Sulphur dioxide	✓	X	X	X
PM ₁₀	✓	X	X	✓

Table 1.2 Results of the updating and screening assessment 2003

1.4.2 Detailed Assessment 2004

The detailed assessment recommended that two AQMA's be declared for Mutley Plain and Exeter Street in Plymouth as a result of traffic emissions. Both of these are main arterial routes in to the city centre. Exeter Street Petrol Station caused some concerns due to the close proximity of Holy Cross Primary School. Monitoring was carried out using only diffusion tubes and therefore more detailed monitoring needed to be carried out. As for PM₁₀ monitoring at Victoria Wharves, there was not enough information at the time to suggest that the objectives would not be met. There was no evidence to suggest that the annual mean would be exceeded but there was some indication that the number of exceedances of the 24-hour objective would be breached. However, monitoring continued over the next twelve months to assess the number of exceedances of the 24-hour objective and the situation was reviewed after 12 months.

1.4.3 Progress Report 2005

A number of new sites were set up to monitor NO₂ within the AQMA's, which indicated that some of these locations were predicted to exceed the annual mean objective for 2005, which formally recognised the need to declare the AQMA's. The predictions made from the monitoring at the Exeter Street AQMA estimated that NO₂ would exceed the 2005 annual mean but was not expected to exceed the 2010 objective. This estimate, however, was viewed with extreme caution due to a large development due to take place in the area that was predicted to have a significant impact on traffic and congestion.

In relation to Benzene, although a full years worth of monitoring data had not yet been acquired to compare to the annual mean, the existing levels were found to be in excess of the 5µg/m³ annual objective figure in the student accommodation building but below at Holy Cross School.

Monitoring for PM₁₀ was carried out at the flats adjacent to Victoria Wharves for a number of months. The annual mean objective of 40µg/m³ was met during each year of monitoring but 2004 provided the only complete year of data. There were intermittent problems with the equipment, which resulted in a significant loss of data.

1.4.4 Updating and Screening Assessment 2006

The USA from 2006 was completed following the revised checklist headings provided in guidance. All pollutants were considered and the results of whether a detailed assessment was required and for which pollutants are detailed in the following Table 1.3. The USA concluded that monitoring would continue within the AQMA's for NO₂ and Benzene, with details being provided in the Further Assessment, due to be submitted later that year. Further monitoring was predicted to continue with regard to PM₁₀ at Victoria Wharves. There were no other significant changes within Plymouth and as a result was not necessary to carry out any detailed assessments.

Pollutant	Updating and screening assessment	Declared AQMA, monitoring continuing	Further monitoring required outside an AQMA	Detailed Assessment required
Carbon monoxide	✓	X	X	X
Benzene	✓	✓	X	X
1,3-butadiene	✓	X	X	X
Lead	✓	X	X	X
Nitrogen dioxide	✓	✓	X	X
Sulphur dioxide	✓	X	X	X
PM ₁₀	✓	X	✓	X

Table 1.3 Results of the updating and screening assessment 2006

1.4.5 Progress Report 2007

Extra tubes were deployed in areas outside the AQMA's to gain a more accurate indication of any exceedances due to a few sites breaching the air quality standard for NO₂. Within the AQMA's, continuous analysers were due to be installed in order to determine peak pollution times. The Exeter Street AQMA had predicted NO₂ levels in excess of the 2010 annual mean and this estimate was predicted to increase due to the new developments taking place. The Benzene results for Holy Cross School were below the current annual mean objective and the installation of the Stage 2 recovery at the petrol station were expected to drop the levels significantly once operational. The PR predicted the revocation of the AQMA for Benzene if levels dropped and remained below the objective of 5µg/m³. The PM₁₀ monitoring that was being carried out at Victoria Wharves ceased in 2006 as the annual mean objective of 40µg/m³ had been met during each year of monitoring. Monitoring was due to start at another port location where dusty cargos were handled in June 2007.

1.4.6 Further Assessment 2007

The results of the further assessment confirmed that Plymouth City Council (PCC) was correct in its decision to declare the two AQMA's for NO₂ and the AQMA for Benzene. The monitoring of NO₂ and Benzene around the boundaries of the AQMA's suggested that the extent of the area declared was sufficient for both Mutley Plain and Exeter Street. In order to meet the objective a 25% reduction in HGVs and a 48% reduction in buses would be needed. The Stage 2 Petrol Vapour Recovery at the petrol station indicated that the AQMA for Benzene was likely to be revoked in the near future.

1.4.7 Progress Report 2008

This report required monitoring to continue in the two AQMA's for NO₂ in Mutley Plain and Exeter Street as exceedances were continuing to occur in both locations, with predictions for 2010 exceedances. Stage 2 Vapour Recovery had been installed at Exeter Street Petrol Station, and the results of the monitoring within the Benzene AQMA indicated that the levels were below the objective. Detailed assessments were also recommended for three new areas of concern where monitoring had continued, namely Royal Parade, Molesworth Road and Tavistock Road, and there was a likely breach of the Air Quality Objectives (AQO).

AQMA	Date of declaration	Reasons for declaration
Exeter Street	May 2005	Predicted exceedance of 2005 NO ₂ objective
Mutley Plain	May 2005	Predicted exceedance of 2005 NO ₂ objective
Exeter Street	May 2005	Potential exceedance of 2010 Benzene objective

Table 1.4 Summary of Current Plymouth City Council AQMAs

The extent and geographical area of the AQMAs are shown in Figure 1.2, 1.3 and 1.4 below.

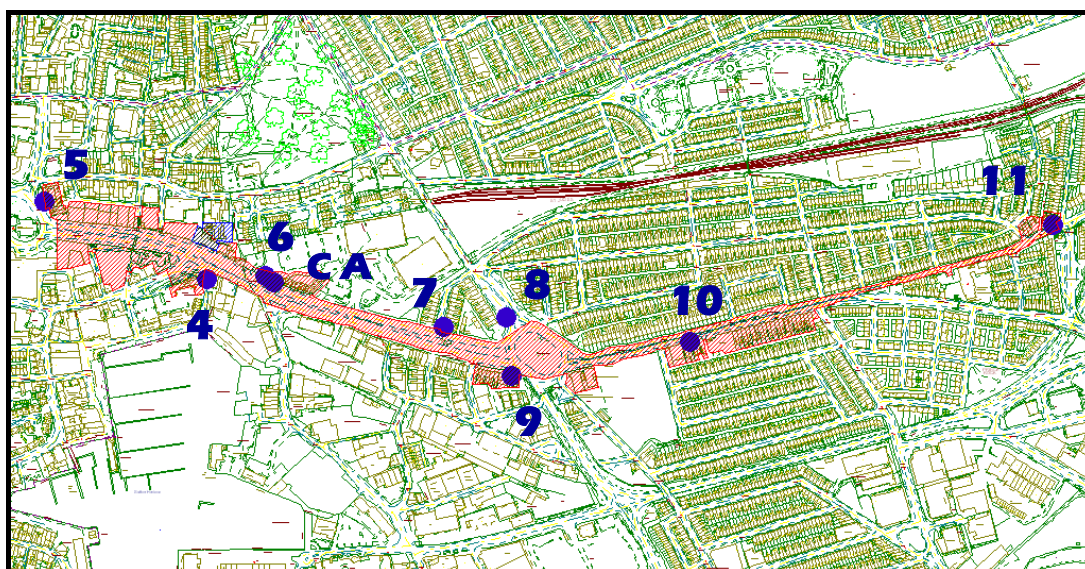


Figure 1.2 Map to show the monitoring locations in the vicinity of the AQMA for Exeter Street.

The sites monitored are highlighted in blue and the Site ID numbers correspond with Table 2.4.

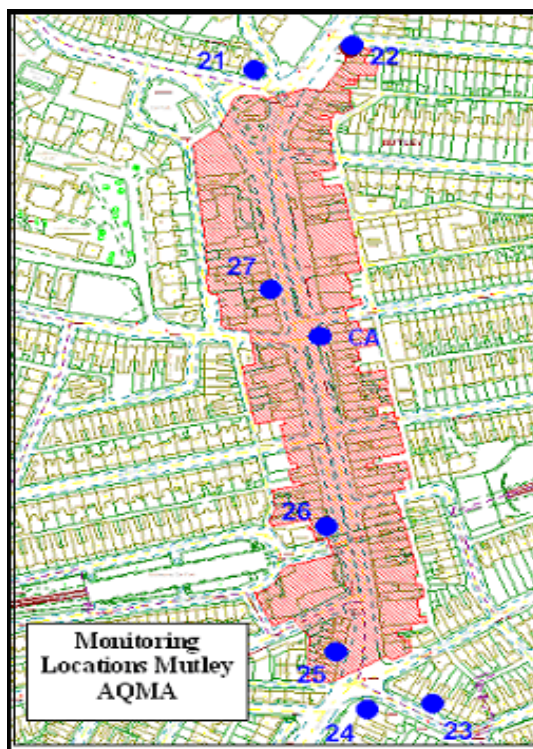


Figure 1.3: Locations of the monitoring sites within the Mutley Plain AQMA. The sites monitored are highlighted in blue and the Site ID numbers correspond with Table 2.4.

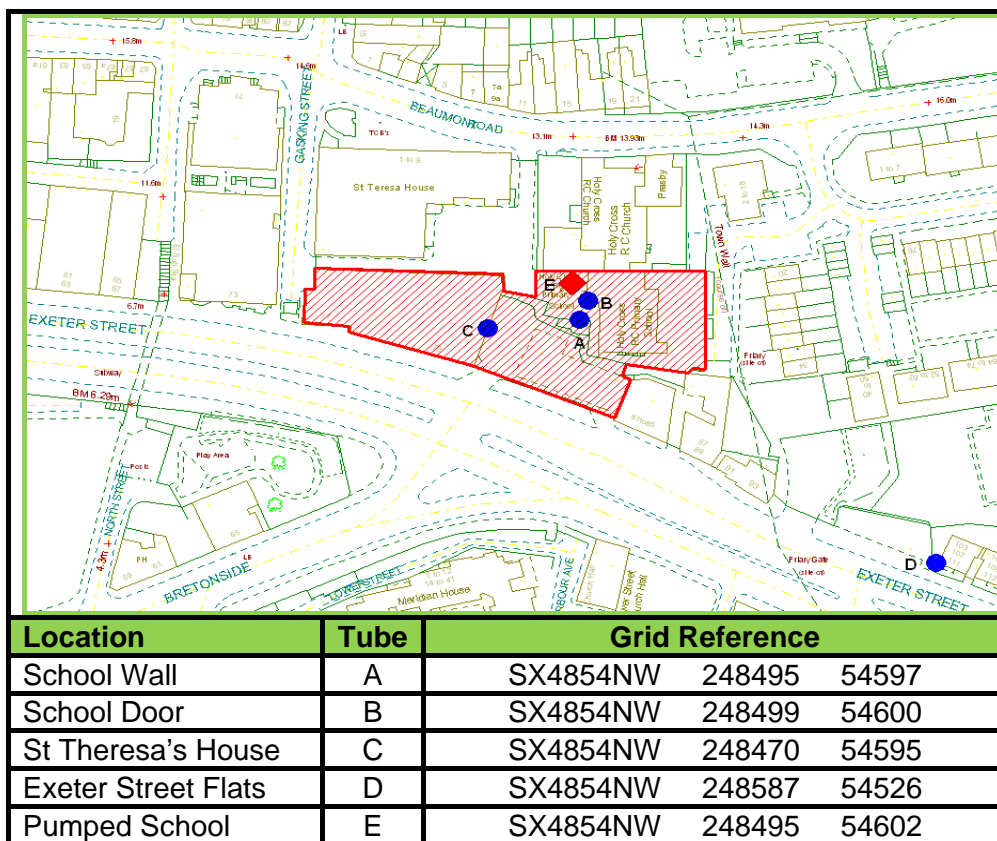


Figure 1.4: Benzene AQMA & Locations of Monitoring Sites.

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

Since Plymouth City Council's last USA report in 2006 there has been continued monitoring of air quality in the following locations. (Maps of each site can be found in subsequent and previous sections):

- The Plymouth City Centre AURN background site. Continuous monitoring takes place for NO₂, CO, SO₂, O₃, and Benzene using a pumped tube sampler as part of the hydrocarbon network. As part of a country wide review of the AURN network CO and SO₂ monitoring ended at the site in 2008. A map of the location is shown on page 9.
- The Mutley Plain AQMA for NO₂ with continuous monitoring of NO₂ supplemented with seven NO₂ diffusion tubes. An aerial photograph of this monitoring site is shown in Figure 1.5, page 11. The monitoring commenced in August 2007.
- The Exeter Street AQMA for NO₂ with continuous monitoring of NO₂ supplemented with nine NO₂ diffusion tubes. An aerial photograph of this monitoring site is shown in Figure 1.6, page 11. The monitoring commenced in August 2007.
- The Exeter Street AQMA for Benzene with continuous/pumped Benzene monitoring supplemented with four Benzene diffusion tubes. An aerial photograph of this monitoring site is shown in Figure 2.2, page 15.
- A further 23 NO₂ diffusion tubes have been deployed around the city in areas of known congestion with relevant exposure outside of the current AQMA's.
- Monitoring for PM₁₀ has started in the Exeter Street AQMA at the site of the continuous analyser as shown in Figure 1.6, page 11, using a TEOM/FDMS monitor, commencing in August 2007.

2.1.1 Automatic Monitoring Sites

Pollution monitoring has been undertaken in Plymouth with varying levels of complexity since the 1960's. At this time only smoke and SO₂ monitoring was undertaken as part of the national network. In 1992 continuous analysers to monitor for SO₂, NO₂ and O₃ were installed.

In 1997, the site became part of the Automatic Urban Network (AUN) and DEFRA added more equipment to the network in the form of a CO analyser and a TEOM particulate monitor. In 2002, a pumped Benzene diffusion tube sampler was added to the suite of equipment as part of the hydrocarbon network operated by National Physics Laboratory (NPL). The site is situated in Armada Way, as shown in Table 2.1. and Figure 2.1.


	Pollutant	Start Date	End Date
	Carbon Monoxide	29/09/1997	30/09/2007
	Nitrogen oxides	29/09/1997	4/11/2008
	Ozone	29/09/1997	-
	Sulphur Dioxide	29/09/1997	30/09/2007
PM10 Particulates (Hourly Measured)	29/09/1997	28/02/2007	
SITE ADDRESS: Armada Way, Plymouth, Devon	Volatile PM10 Particulates (Hourly Measured)	01/03/2007	-
OS Grid Reference: SX477546 Site Type: <u>Urban Centre</u>	Non-Automatic Hydrocarbons	01/03/2007	4/11/2008
The monitoring station is within an existing brick building located in the main pedestrianised shopping area in the city centre. The nearest road is approximately 200 metres from the station and is a busy 2/4 lane urban carriageway. The manifold inlet is approximately 3 metres high. The surrounding area comprises business and retail outlets in an urban environment.			

Table 2.1 Plymouth centre AURN Site details

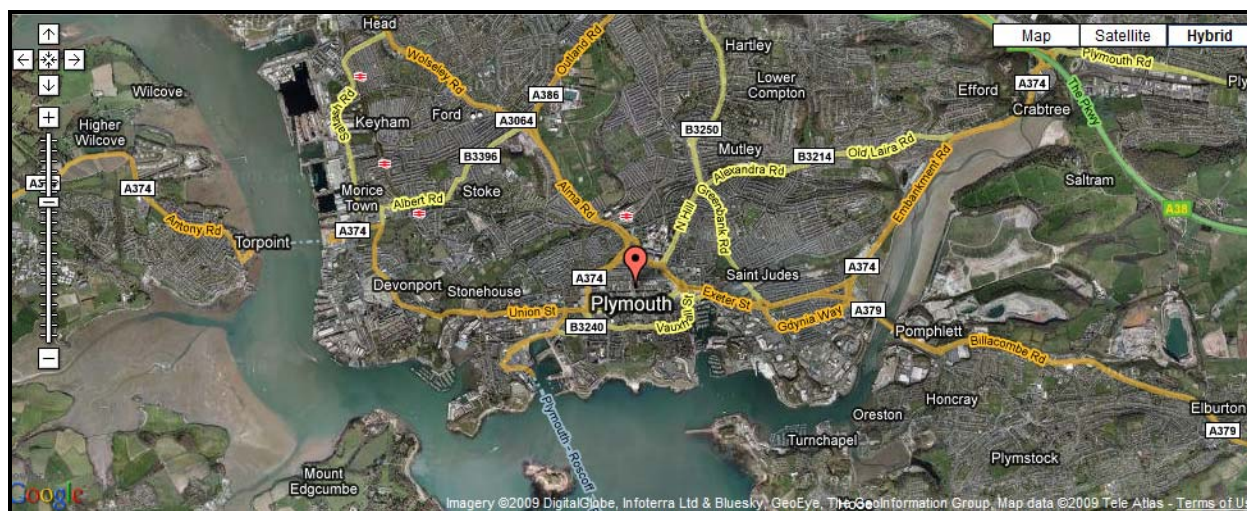


Figure 2.1 Location of the Plymouth Centre AURN.

The Plymouth Centre has recently undergone a period of refurbishment and has had new Thermo NO₂ and O₃ analysers installed and is at the time of compiling this report awaiting the re-installation of the PM₁₀ and the addition of a PM_{2.5} sampler.

Plymouth City Council has provided Local Site Officer (LSO) support for the Plymouth Centre AURN since its amalgamation into the national network in 1997. The LSO support will continue after recently being re-awarded the contract in March 2009.

2.1.2 Independent Automatic Monitoring

Independent monitoring of Benzene was carried out within the AQMA using a pumped sampler purchased and maintained by NPL. This was removed from its location at Holy Cross Primary School in August 2008 with the conclusion of the monitoring programme. NPL provided full support for the sampler during its installation at the School. QA/QC data is provided in Appendix 1, page 46.

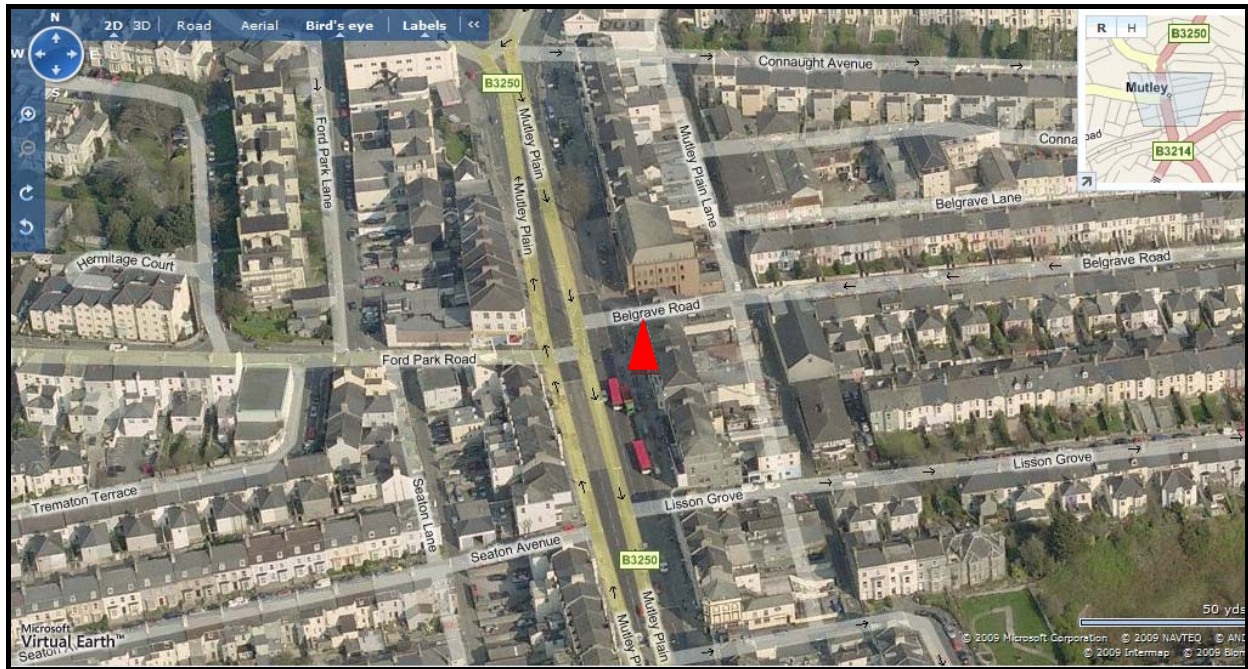
Independent continuous monitoring of NO₂ is undertaken by Plymouth City Council at two locations in the central area of Plymouth. Both sites are within the Exeter Street and Mutley AQMAs and both sites became operational in August 2007. The Exeter Street site also measures PM₁₀ concentrations using a TEOM/FDMS analyser

Calibrations are automatically carried out and Air Monitors Ltd, store, collate and ratify the data through the AQ Web software.

The Quality Assurance/Quality Control (QA/QC) procedures for the two analysers are equivalent to the UK Automatic Urban and Rural Network (AURN) procedures. The details of the three independent monitoring sites are contained in Table 2.2 below. Aerial photographs of the Exeter Street and Mutley Plain sites can be found in Figures 1.5 and 1.6 on page 11.

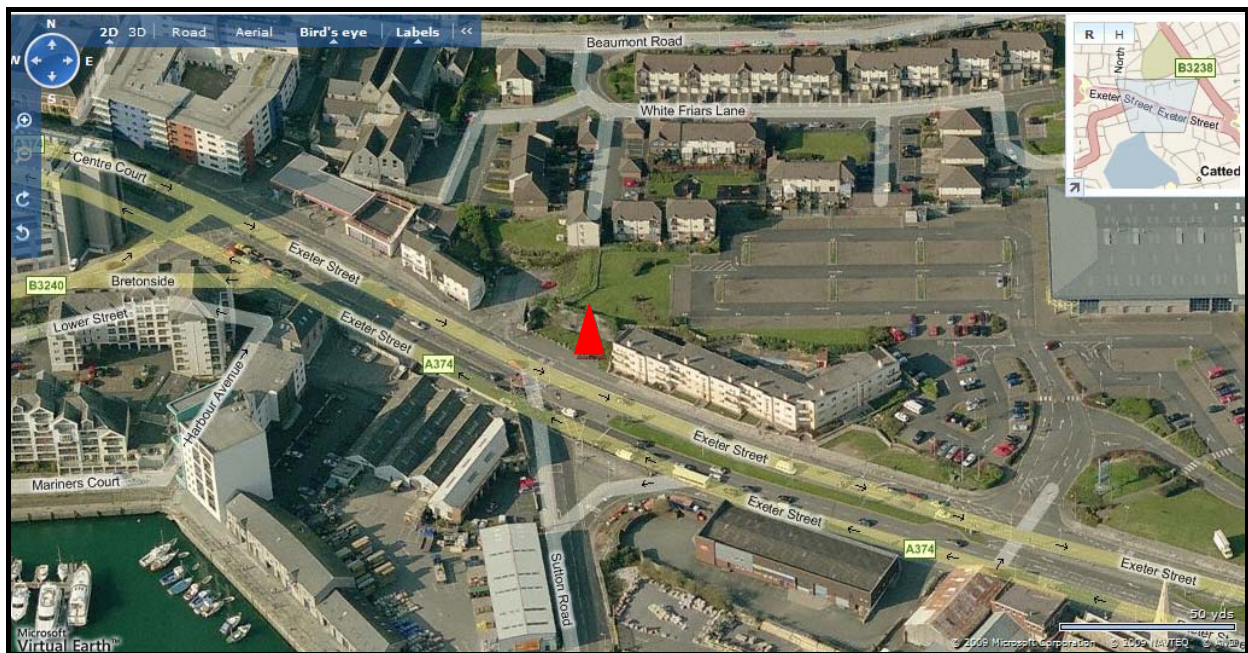
Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA ?	Relevant Exposure	Distance to kerb of nearest road	Worst-case Location?
Mutley Plain	Roadside	X 248385 Y 55815	NO ₂	Y	Y	4.7m	Y
Exeter Street	Roadside	X 248576 Y 54533	NO ₂ PM ₁₀	Y	Y (0m)	5.5m	Y
Pumped sampler- Exeter Street	Urban background	X24854 Y54602	Benzene	Y	Y (5m)	N/a	Y

Table 2.2: Details of Independent Automatic Monitoring Sites



▲ Thermo NO₂ Analyser

Figure 1.5: Mutley Plain Analyser Location



▲ Thermo NO_x Analyser & TEOM/FDMS

Figure 1.6: Exeter Street Analyser Location

An order for has been placed with Air Monitors for three new enclosures and thermo analysers to be sited within three new areas where diffusion monitoring has identified elevated NO₂ concentrations and indicated exceedances of the NO₂ objective. These sites are due to become operational in during the summer of 2009. The locations of these new sites are provided in Table 2.3 below.

Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure	Distance to kerb of nearest road	Worst-case Location ?
Alma Road	Roadside	X=247309 Y=53423	NO ₂	Y	Y	4.7m	Y
Royal Parade	Roadside	X=247685 Y=54476	NO ₂	Y	Y (0m)	5.5m	Y
Tavistock Road	Roadside	X=248480 Y=58504	NO ₂	Y	Y (5m)	N/a	Y

Table 2.3 Proposed continuous monitoring sites to commence summer 2009.

All equipment is MCERTS compliant and Air Monitors Ltd provide all support measures, for example routine site maintenance, QA/QC and data ratification and data storage. PCC officers (LSO's) undertake routine visits to the site for the purpose of fault finding and filter change.

2.1.3 Non-Automatic Monitoring (NO₂)

Passive monitoring is undertaken at 55 locations within the Plymouth boundary for NO₂. Most sites represent relevant exposure as indicated below. Those sites that are not representative of relevant exposure are deployed at the request of the transport department to determine the concentrations of NO₂ at proposed new road schemes. The details of these locations are contained in 2.4 Table below.

Tube No.	Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA ?	Relevant Exposure ?	Distance to kerb of nearest road	Worst-case Location?
1	Control/Blank	N/a	X 247683 Y 54395	NO ₂	N	N/a	N/a	Y
2	St. Catherine's House	Roadside	X247617 Y 54262	NO ₂	N	Y (0m)	2.88m	Y
3	81a - 85a Vauxhall St	Roadside	X 248239 Y 54290	NO ₂	N	Y (0m)	4.11m	Y
4	Mariners Court	Roadside	X 248488 Y 54527	NO ₂	Y	Y (9m)	8.51m	Y
5	Charles Cross	Roadside	X 248246 Y 54644	NO ₂	Y	Y (0m)	10m	Y
6	Exeter Street Flats (103-111)	Roadside	X 248586 Y 54526	NO ₂	Y	Y (0m)	5.5m	Y
7	4 St Judes Road	Roadside	X 248841 Y 54458	NO ₂	Y	Y (0m)	4.9m	Y
8	11 Tothill Road	Roadside	X 248923 Y 54470	NO ₂	Y	Y (0m)	13m	Y
9	212a Exeter Street	Roadside	X 248942 Y 54385	NO ₂	Y	Y (0m)	6.7m	Y
10	48 Embankment Rd	Roadside	X 249211 Y 54435	NO ₂	Y	Y (0m)	30m	Y
11	211 Embankment Rd	Roadside	X 249752 Y 54610	NO ₂	Y	Y (0m)	3.8m	Y

12	Portakabin depot Embankment Rd	Roadside	X 250307 Y 55273	NO ₂	Y	Y (2m)	1.9m	Y
13	2 Woodford Avenue	Roadside	X 252285 Y 56713	NO ₂	N	Y (0m)	9.3m	Y
14	422 Tavistock Road	Roadside	X 250072 Y 60991	NO ₂	N	Y (6m)	9.3m	Y
15	45 Tavistock Road	Roadside	X 248440 Y 58412	NO ₂	Y	Y (8m)	9.4m	Y
16	203 Crownhill Road	Roadside	X 247293 Y 59137	NO ₂	Y	Y (0m)	10.5m	Y
17	Outland Road	Roadside	X 247716 Y 57301	NO ₂	Y	Y (12m)	12.3m	Y
18	161 Molesworth Rd	Roadside	X 246206 Y 55815	NO ₂	Y	Y (0m)	3.7m	Y
19	Pennycomequick flats (1-23)	Roadside	X 247343 Y 55315	NO ₂	N	Y (0m)	12.4m	Y
20	Caprera Place	Roadside	X 247658 Y 55194	NO ₂	N	Y (0m)	1.7m	Y
21	2 Hyde Park Road	Roadside	X 248309 Y 56028	NO ₂	Y	Y (0m)	6.8m	Y
22	Connells Mutley Plain	Roadside	X 248404 Y 56039	NO ₂	Y	Y (0m)	1.6m	Y
23	6 Alexandra Place	Roadside	X 248352 Y 55853	NO ₂	Y	Y (0m)	6.1m	Y
24	140 North Hill	Roadside	X 248415 Y 55528	NO ₂	Y	Y (0m)	10m	Y
25	14a Mutley Plain	Roadside	X 248401 Y 55173	NO ₂	Y	Y (0m)	3.9m	Y
26	22 Mutley Plain	Roadside	X 248392 Y 55669	NO ₂	Y	Y (0m)	5.6m	Y
27	Mutley Plain enclosure.	Roadside	X 248352 Y 55853	NO ₂	Y	Y (10m)	4.7m	Y
28	28 Oxford Place	Roadside	X 247628 Y 54948	NO ₂	N	Y (0m)	1.6m	Y
29	Cobourg Street	Roadside	X 247816 Y 54927	NO ₂	N	Y (0m)	8.3m	Y
30	Royal Parade	Roadside	X 247710 Y 54479	NO ₂	Y	Y (14m)	9.2m	Y
31	AURN	Urban Centre	X 247751 Y 54605	NO ₂	N	N/a	N/a	N/a
32	AURN	Urban Centre	X 247751 Y 54605	NO ₂	N	N/a	N/a	N/a
33	AURN	Urban Centre	X 247751 Y 54605	NO ₂	N	N/a	N/a	N/a
34	Milehouse Road	Roadside	X 246219 Y 55833	NO ₂	Y	Y (0m)	5.3m	Y
35	12 Devonport Road	Roadside	X 246162 Y 55761	NO ₂	Y	Y (0m)	3.2m	Y
36	Morshead Rd	Roadside	X 248477 Y 58481	NO ₂	Y	Y (27m)	3.9m	Y
37	Great Berry Road	Roadside	X 248445 Y 58481	NO ₂	Y	Y (6m)	5.3m	Y
38	Royal Parade	Roadside	X 247976 Y 54483	NO ₂	Y	Y (9m)	2.8m	Y
39	Derry's Cross roundabout	Roadside	X 247454 Y 54449	NO ₂	Y	Y (7m)	5.7m	Y
40	15 Devonport Road	Roadside	X 246173 Y 55755	NO ₂	Y	Y (0m)	1.96m	Y
41	Nomony Children's Centre	Roadside	X 249049 Y 54236	NO ₂	N	Y (0m)	9.6m	Y

42	East End Resource Centre	Roadside	X 249027 Y 54317	NO ₂	N	Y (0m)	9.3m	Y
43	68 Mainstone Avenue	Roadside	X 249374 Y 54317	NO ₂	N	Y (5.5m)	7.55m	Y
44	7a River View	Roadside	X 249610 Y 54271	NO ₂	N	Y (10m)	4.5m	Y
45	8a River View	Roadside	X 249553 Y 54332	NO ₂	N	Y (7m)	10.5m	Y
46	Wolverwood Lane	Roadside	X 256050 Y 55500	NO ₂	N	N	12m	Y
47	Deep Lane	Roadside	X 256175 Y 55409	NO ₂	N	N	8m	Y
48	Roseveare Close	Roadside	X 252481 Y 55581	NO ₂	N	N	5m	Y
49	Woodland Close	Roadside	X 252478 Y 53616	NO ₂	N	Y (11m)	13m	Y
51	Hillside Crescent	Roadside	X 251769 Y 53805	NO ₂	N	Y (5.9m)	1m	Y
52	Horn Lane	Roadside	X 251590 Y 52887	NO ₂	N	Y (13m)	N/a	Y
53	Colesdown Hill	Roadside	X 252272 Y 54215	NO ₂	N	Y (24m)	N/a	Y
54	114 Billacombe Rd	Roadside	X 251387 Y 53935	NO ₂	N	Y (17m)	13.6m	Y
55	70 Billacombe Rd	Roadside	X 250980 Y 54015	NO ₂	N	Y (25m)	15.9m	Y

Table 2.4 – Details of Non-Automatic Monitoring Sites

Tubes are supplied by Gradko International Ltd. and the standard method recommended by NETCEN is followed. Gradko are a fully accredited establishment and supply tubes to many Local Authorities. NO₂ diffusion tubes are clear plastic tubes, with one open end and a closed end containing a NO₂ absorbing chemical matrix (triethanoamine). The types of tubes used are 20% TEA in water. The open end is sealed with a plastic cap before it is transported to the monitoring location. At the site the cap is removed and the tube is mounted vertically with the open end at the bottom. All tubes are exposed for a period of four weeks. Further details are provided in Appendix 1.

Benzene diffusion tubes are supplied by Gradko International Ltd. Analysis is carried out using gas chromatography/thermal desorption techniques. Standard solutions are prepared covering the concentration range 10-2000ng and there is an uptake rate of 1.28ng per ppm per minute. Non-automatic monitoring is undertaken at 4 sites as shown in Figure 1.4 on page 7 with further details provided in Table 2.5, page 15.

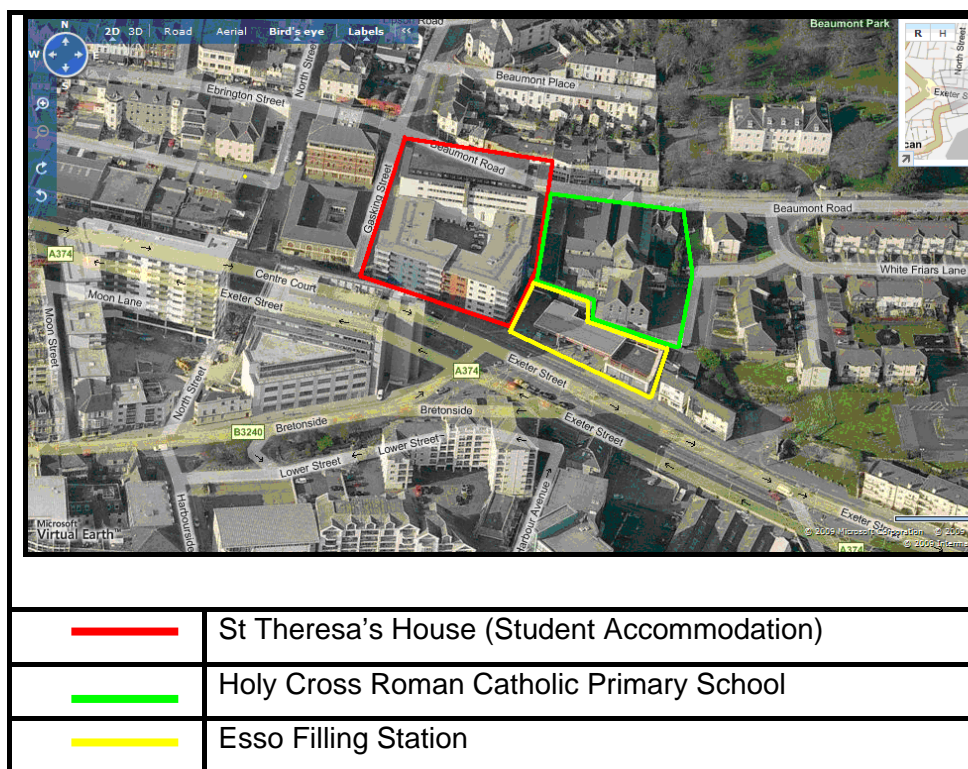


Figure 2.2: Aerial view of the BTEX tubes and the pumped sampler within the AQMA.

Tube No.	Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure	Distance to kerb of nearest road	Worst-case Location?
A	School Wall	Roadside	X, 248495 Y, 54597	Benzene	Y	Y (3m)	N/A	Y
B	School Door	Roadside	X, 248499 Y, 54600	Benzene	Y	Y (0m)	N/A	Y
C	St Theresa's House	Roadside	X, 248470 Y, 54595	Benzene	Y	Y (0m)	N/A	Y
D	Exeter Street Flats	Roadside	X, 248587 Y, 54526	Benzene	N	Y (0m)	5m	Y
E	AURN Roof	Urban background	X, 247749 Y, 54612	Benzene	N	N	N/A	N (co location study)
F	Pumped sampler Exeter Street	Urban background	X, 248499 Y, 54600	Benzene	Y	N	N/a	N
G	AURN Roof	Urban background	X, 247749 Y, 54612	Benzene	Y	N	N/a	N

Table 2.5: Details of Benzene Monitoring sites

2.1.4 Quality Assurance and Quality Control

Quality Assurance and Quality Control (QA/QC) measures are detailed in Appendix 1, page 46 for both the automatic and passive monitoring sites, with details of all relevant information required, such as bias adjustment factors and co-location exercises.

3.0 Comparison of Monitoring Results with Air Quality Objectives

3.1 NO₂

The mean annual background NO_x and NO₂ concentrations for the years 2006 and 2010 for each 1km² grid square within the Plymouth City Council boundary are available from the internet at: (www.airquality.co.uk/archive/laqm/tools.php). The average for the year and highest 1km² grid square concentrations for these years are given in Table 2.6 below.

Pollutant	Average	Maximum
NO _x 2006 (total)	14.98	19.79
NO _x 2007 (total)	14.46	19.12
NO _x 2008 (total)	16.42	22.36
NO _x 2009 (total)	22.37	15.59
NO _x 2010 (total)	20.02	14.76
NO ₂ 2006	23.86	17.25
NO ₂ 2007	18.08	25.08
NO ₂ 2008	13.95	18.18
NO ₂ 2009	13.43	17.84
NO ₂ 2010	12.92	17.17

Table 2.6: Background Concentrations for NO_x and NO₂ (µg/m³)

3.1.2 Automatic Monitoring Data

The 2008 and previous years monitoring results obtained from the Plymouth Centre AURN and automatic sites at Exeter Street and Mutley Plain are shown in Table 2.7 below.

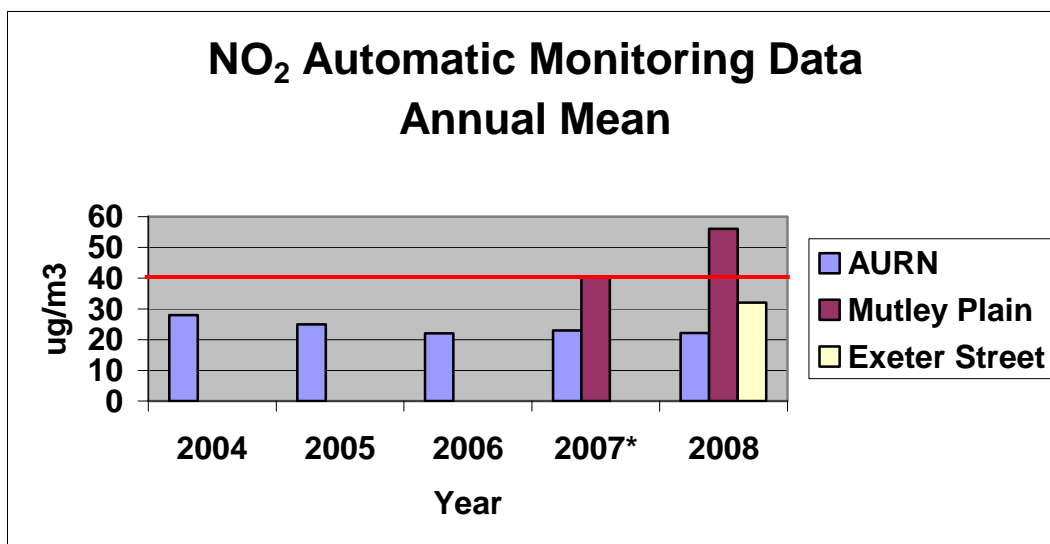
Site ID	Location	Within AQMA?	Proportion of year with valid data 2008 %	Annual mean concentrations (µg/m ³)				
				2004	2005	2006	2007	2008
AURN	Armada Way	N	85*	28.0	25.0	22.0	23.0	22.1
MP	Mutley Plain	Y	100	N/a	N/a	N/a	40.47*	56
ES	Exeter Street	Y	100	N/a	N/a	N/a	31.33*	32

* Period mean adjusted and data capture less than 90%

Table 2.7 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2008 %	Number of Exceedances of hourly mean (200 µg/m ³) <i>If the period of valid data is less than 90% of a full year, include the 99.8th percentile of hourly means in brackets.</i>		
				2006	2007	2008
AURN	Armada Way	N	85	0	0	0
	Exeter Street	Y	100	0	0	0
	Mutley Plain	Y	99	0	0	0

Table 2.8 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour Mean Objective



* Commenced in AQMA's, August 07, 6 months data only

Figure 2.3; Results of Automatic Monitoring for Nitrogen Dioxide Mean Annual 2004 to 2008

The 2008 and previous years' monitoring results obtained from the Plymouth Centre AURN and automatic sites at Exeter Street show that the concentrations of NO₂ were below the annual mean air quality objective of 40 µg/m³ for NO₂. However, data obtained from the Mutley Plain site shows an exceedance of the objective. The data shows that there were no exceedances of the hourly objective of 200µg/m³.

3.1.3 Non Automatic Monitoring Data

The 2008 and previous years monitoring results obtained from Plymouth's passive monitoring programme are shown in Table 2.9a below.

Site ID	Location	Within AQMA?	Data Capture 2008 %	Annual mean concentrations
				2008 (µg/m ³) Adjusted for bias
2	St Catherine's House	N	92	31.19
3	Vauxhall St	N	100	33.61
4	Mariners Court	Y	85**	28.20
5	Charles Cross	Y	100	39.57
6	Exeter Street Flats	Y	100	35.66
7	4 St Judes Road	Y	92	32.54
8	11 Tothill Road	Y	100	30.37
9	212a Exeter Street	Y	92	39.98
10	48 Embankment Rd	Y	100	41.68
11	211 Embankment Rd	Y	100	39.19
12	Portakabin Depot	Y	100	31.11
13	2 Woodford Avenue	N	100	27.95
14	422 Tavistock Road	N	77**	35.94
15	45 Tavistock Road	N	77**	52.9210

16	203 Crownhill Road	Y	85	25.15
17	Outland Road	Y	100	33.01
18	161 Molesworth Rd	Y	100	43.69
19	Pennycomequick	N	100	31.43
20	Caprera Place	N	62**	30.65
21	2 Hyde Park Road	Y	100	33.47
22	Connells	Y	85**	35.27
23	6 Alexandra Place	Y	92	33.97
24	140 North Hill	Y	100	29.88
25	14a Mutley Plain	Y	92	42.81
26	22 Mutley Plain	Y	92	46.24
27	Mutley Plain (cont)	Y	92	46.41
28	28 Oxford Place	N	100	35.03
29	Cobourg Street	N	100	31.89
30	Royal Parade (A)	Y	54**	52.92
31	AURN	N	54**	24.76
32	AURN	N	54**	24.10
33	AURN	N	54**	24.80
34	Milehouse Road	Y	85	39.97
35	12 Devonport Road	Y	100	34.33
36	Morshead Rd	Y	85	39.93
37	Great Berry Road	Y	100	46.80
38	Royal Parade (B)	Y	90	49.44
39	Derry's Cross	Y	100	53.56
40	15 Devonport Road	Y	85**	37.72
41	Nomony Children's	N	100*	53.90
42	East End Resource	N	100*	37.70
43	68 Mainstone Ave	N	100*	38.52
44	7a River View	N	33**	42.03
45	8a River View	N	100*	37.50
46	Wolverwood Lane	N	92	25.52
47	Deep Lane	N	100	33.40
48	Roseveare Close	N	92	18.22
49	Woodland Close	N	92	17.68
50	164 Elburton Road	N	85**	31.39
51	Hillside Crescent	N	100	23.34
52	Horn Lane	N	92	23.24
53	Colesdown Hill	N	100	12.44
54	114 Billacombe Rd	N	100	22.43
55	70 Billacombe Rd	N	100	18.15

*Based on 3 months data

** Less than 90% data capture

Table 2.9a Results of NO₂ Diffusion Tubes

Site ID	Location	Within AQMA?	Annual mean concentrations ($\mu\text{g}/\text{m}^3$) Adjusted for bias					
			2004	2005	2006	2007	2008	
2	St. Catherine's House	N	N/A	N/A	29.6	34.48	31.19	
3	81a - 85a Vauxhall St	N	N/A	N/A	25.7	34.32	33.61	
4	Mariners Court	Y	34.57	31.31	26.7	33.41	28.20	
5	Charles Cross	Y	42.48	36.31	37.4	45.13	39.57	
6	Exeter Street Flats	Y	40.95	41.48	37.2	40.34	35.66	
7	4 St Judes Road	Y	34.35	30.51	30.1	30.58	32.54	
8	11 Tothill Road	Y	33.34	28.53	27.8	31.87	30.37	
9	212a Exeter Street	Y	43.80	35.29	34.1	40.63	39.98	
10	48 Embankment Rd	Y	38.18	42.13	43.96	46.20	41.68	
11	211 Embankment Rd	Y	36.54	35.96	32.7	39.96	39.19	
12	Embankment Road (PK)	Y	29.80	26.01	28.3	33.15	31.11	
13	2 Woodford Avenue	N	30.99	25.56	26.2	30.26	27.95	
14	422 Tavistock Road	N	N/A	36.83	27.6	36.63	35.94	
15	45 Tavistock Road	Y	N/A	37.86	36.5	45.31	45.08	
16	203 Crownhill Road	Y	N/A	N/A	8.4	20.84	25.15	
17	Outland Road	Y	24.68	28.02	28.6	35.33	33.01	
18	161 Molesworth Rd	Y	N/A	N/A	N/A	44.22	43.69	
19	Pennycomequick flats	N	35.60	31.27	30.7	34.42	31.43	
20	Caprera Place	N	36.64	31.82	32.3	35.57	30.65	
21	2 Hyde Park Road	Y	30.26	29.46	30.0	35.60	33.47	
22	Connells Mutley Plain	Y	37.11	33.03	27.9	37.72	35.27	
23	6 Alexandra Place	Y	35.54	30.68	31.0	38.80	33.97	
24	140 North Hill	Y	33.39	30.91	27.5	32.22	29.88	
25	14a Mutley Plain	Y	49.30	44.01	38.8	48.92	42.81	
26	22 Mutley Plain	Y	43.29	42.46	41.9	49.54	46.24	
27	Mutley Plain (C/A)	Y	N/A	N/A	43.0	52.94	46.41	
28	28 Oxford Place	N	N/A	31.68	33.2	38.15	35.03	
29	Cobourg Street	N	N/A	34.14	29.6	33.71	31.89	
30	Royal Parade (A)	Y	N/A			59.38	52.92	
31	AURN	N	26.08	25.22	21.2	26.69	24.76	
32	AURN	N	26.20	24.35	24.8	27.62	24.10	
33	AURN	N	24.99	25.75	24.7	26.33	24.80	
34	Milehouse Road	Y	N/A			46.00	39.97	
35	12 Devonport Road	Y	N/A			45.47	34.33	
36	Morshead Rd	Y	N/A			40.47	39.93	
37	Great Berry Road	Y	N/A			51.10	46.80	
38	Royal Parade (B)	Y	N/A			56.29	48.39	
39	Derry's Cross roundabout	Y	N/A			57.33	53.56	
40	15 Devonport Road	Y	N/A					37.72
41	Nomony Child Centre	N	N/A					53.90
42	East End Centre	N	N/A					37.70
43	68 Mainstone Ave	N	N/A					38.52
44	7a River View	N	N/A					42.03
45	8a River View	N	N/A					37.50
46	Wolverwood Lane	N	N/A					25.52
47	Deep Lane	N	N/A					33.40
48	Roseveare Close	N	N/A					18.22
49	Woodland Close	N	N/A					17.68
50	164 Elburton Road	N	N/A					31.39
51	Hillside Crescent	N	N/A					23.34
52	Horn Lane	N	N/A					23.24
53	Colesdown Hill	N	N/A					12.44
54	114 Billacombe Rd	N	N/A					22.43
55	70 Billacombe Rd	N	N/A					18.15

Table 2.9b Results of Nitrogen Dioxide Diffusion Tubes
Environmental Protection and Monitoring Unit

The following figures, (Figure 2.4 and 2.5 respectively) show the bias adjusted results for the NO₂ diffusion tubes located within the two AQMAs for the years 2004 to 2008.

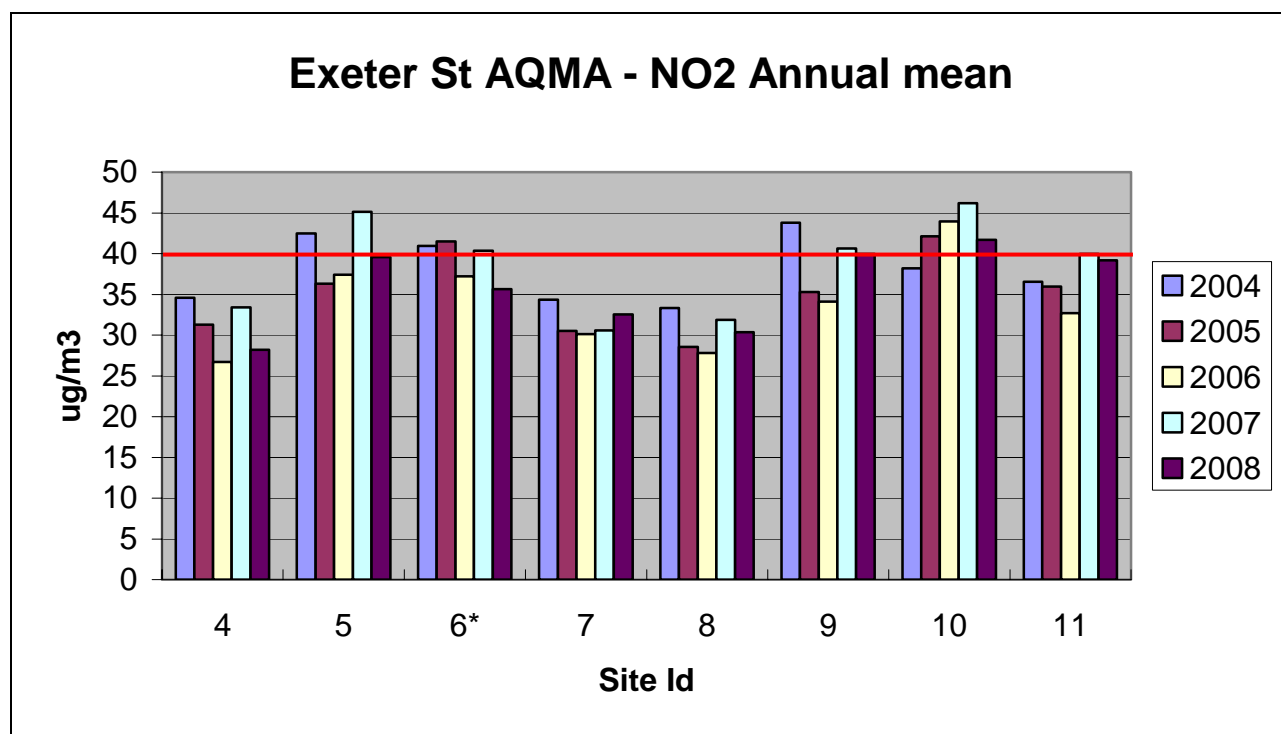


Figure 2.4 Exeter Street AQMA NO₂ Annual Mean 2004 – 2008 (Bias Adjusted)

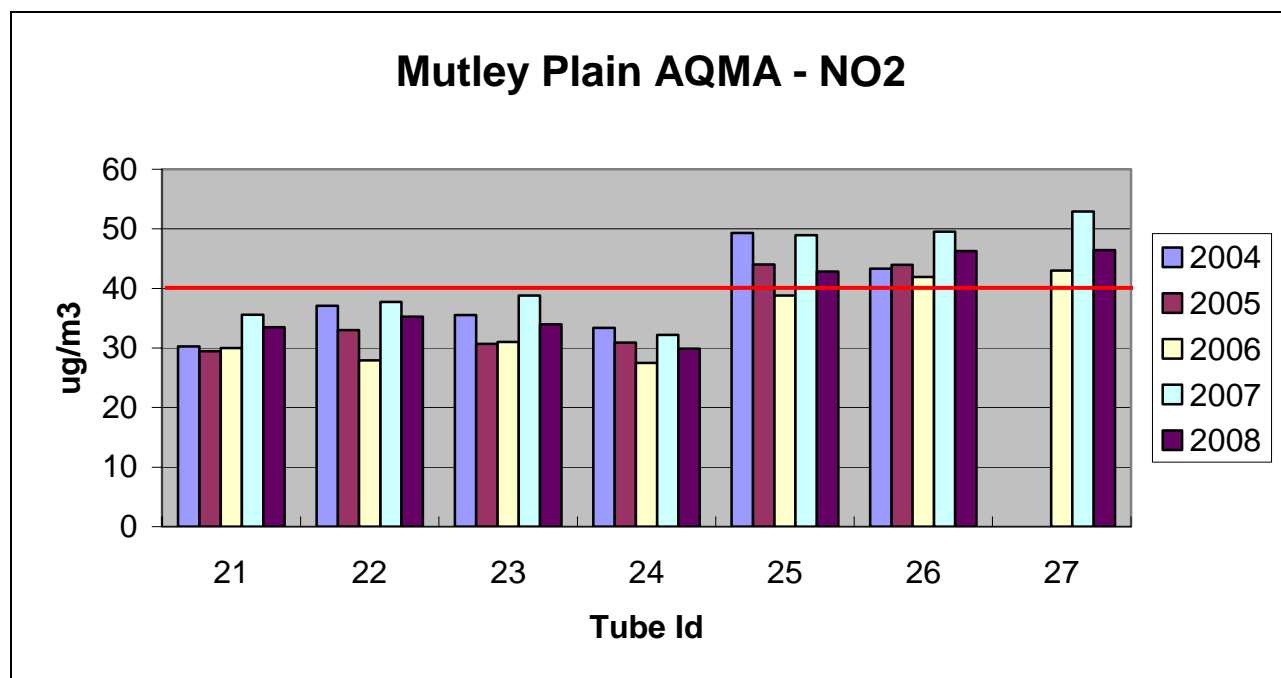


Figure 2.5 Mutley Plain AQMA NO₂ Annual Mean 2004 – 2008 (Bias Adjusted)

The following charts, (Figure 2.6, 2.7 and 2.8 respectively) show the bias adjusted results for the proposed three new AQMAs for the available data years.

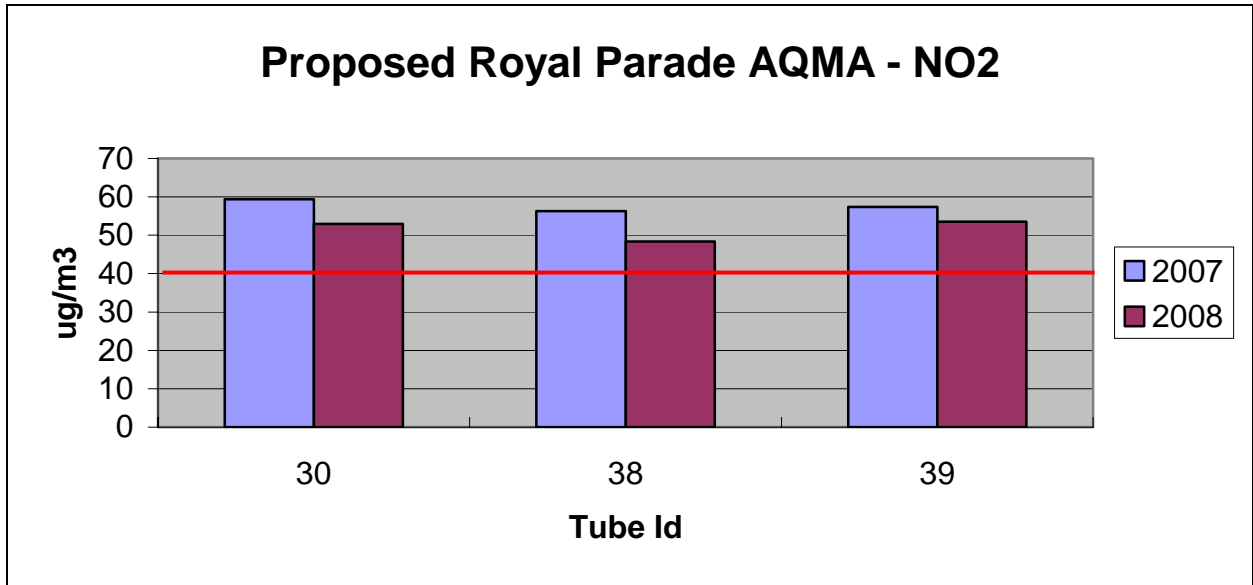


Figure 2.6 Proposed Royal Parade AQMA NO₂ Annual Mean – 2008 (Bias Adjusted)

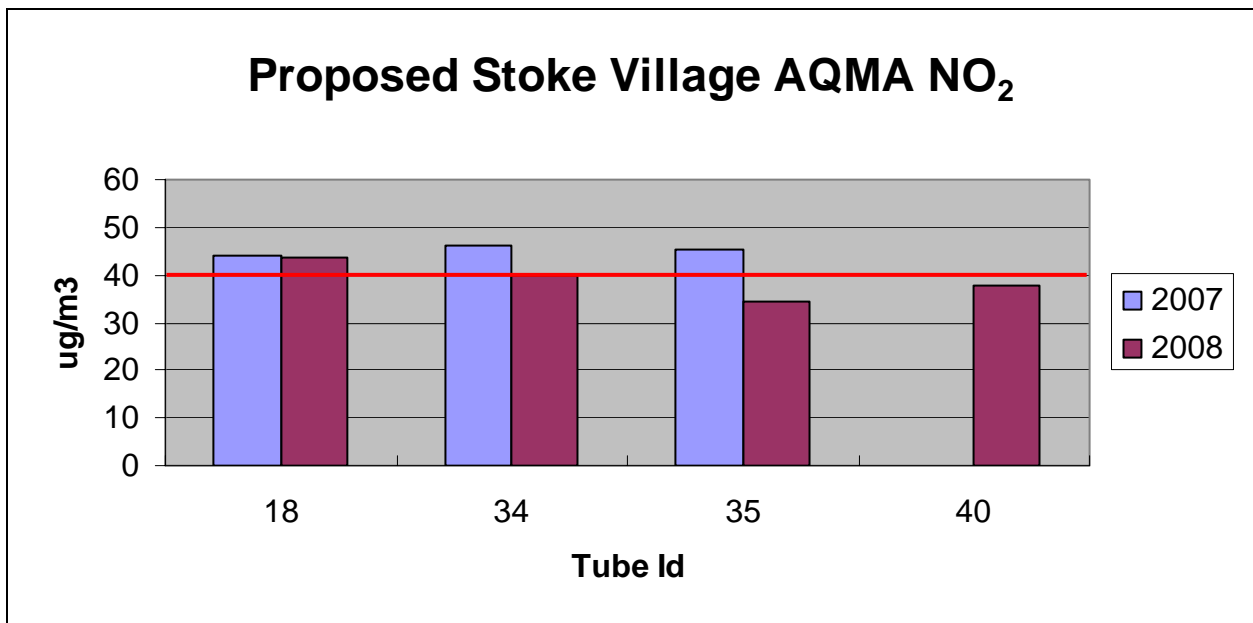


Figure 2.7 Proposed Stoke AQMA NO₂ Annual Mean 2007-08 – 2008 (Bias Adjusted)

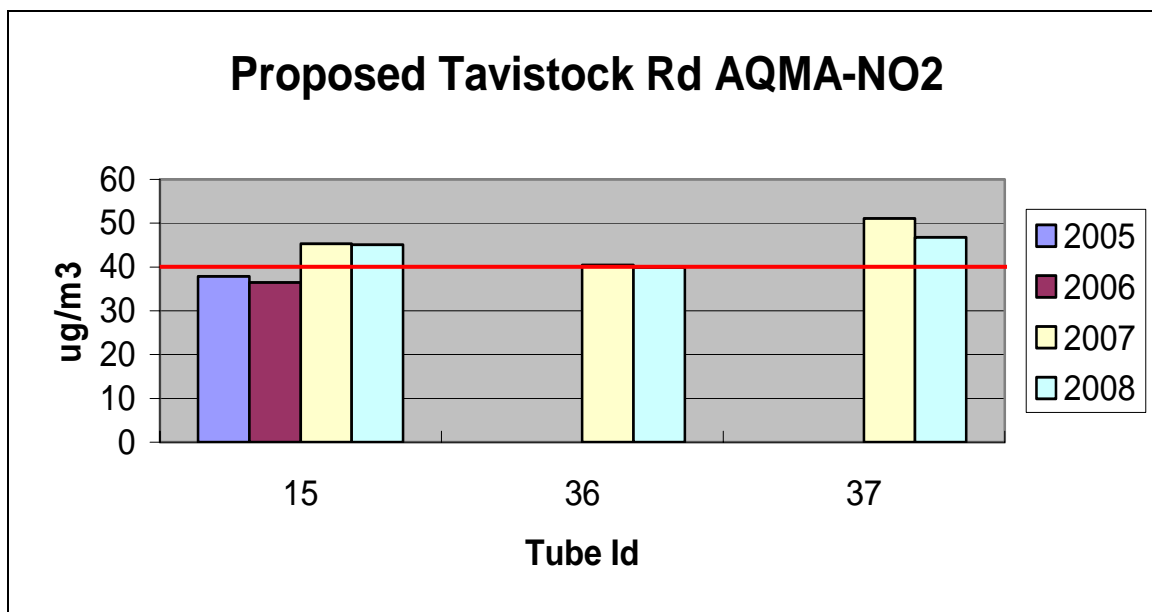


Figure 2.8 Proposed Crownhill AQMA for NO₂ Annual Mean 2005-08

These results of the three proposed new AQMAs for NO₂ will be discussed fully in a detailed assessment report to be submitted in April 2009.

3.2 PM₁₀

3.2.1 Background Concentrations of PM₁₀ in Plymouth

The mean annual background PM₁₀ concentrations for the years 2006 to 2010 for each 1km² grid square within the Plymouth City Council boundary are available from the internet at: (www.airquality.co.uk/archive/laqm/tools.php). The average for the year and highest 1km² grid square concentrations for these years are given in Table 2.10 below.

Year	Average (µg/m3)	Maximum (µg/m3)
2006	18.53	22.78
2007	18.35	21.82
2008	18.18	21.62
2009	18.01	21.6
2010	17.84	21.21

2.10 Maximum background concentrations of PM₁₀ in Plymouth 2006-10

These results are more clearly depicted in the following chart, Figure 2.9.

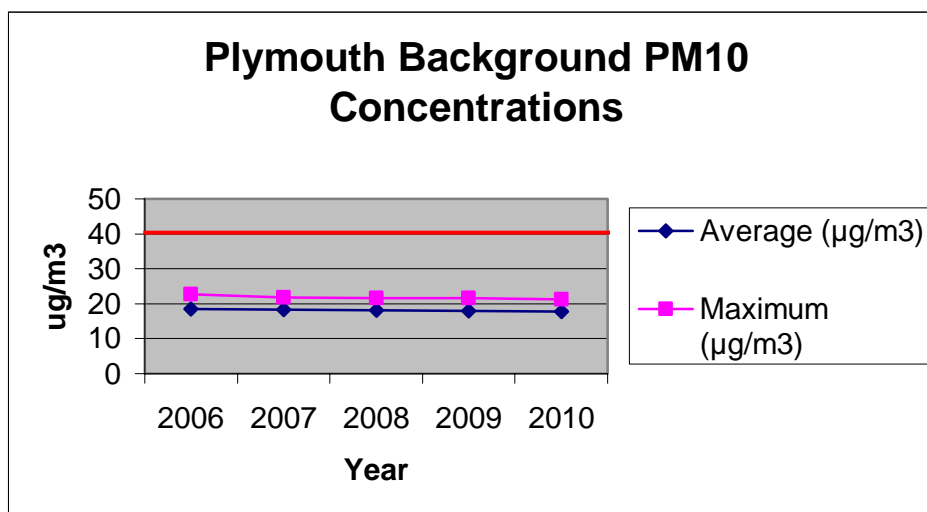


Figure 2.9: Background concentrations of PM₁₀

3.2.2 Automatic Monitoring Data

PM₁₀ is monitored at two locations within Plymouth. One is at the Plymouth Centre AURN site and the other is located at a roadside location that is adjacent to a residential block of flats and near to a busy intersection with Exeter Street and Bretonside, which also forms a busy bus route from the city centre.

Data from the monitoring sites are available as 24-hour averages and annual averages. The data capture rate for the AURN site in 2008 was low at 78%. This was due to all analytical equipment being removed for site refurbishment and upgrading. The data capture rate for the Exeter Street site was 100% therefore direct comparisons with the objectives can be made. This monitoring site began in August 2007.

Location	Within AQMA?	Data Capture 2008 %	Annual mean concentrations (µg/m ³)			
			2005	2006	2007	2008
Armada Way	N	74	16.42	15	18.29	15
Exeter Street	Y for NO ₂	100	-	-	26.40*	30.32

*Less than 90%

Table 2.11 Results of PM₁₀ Automatic Monitoring: Comparison with Annual Mean Objective

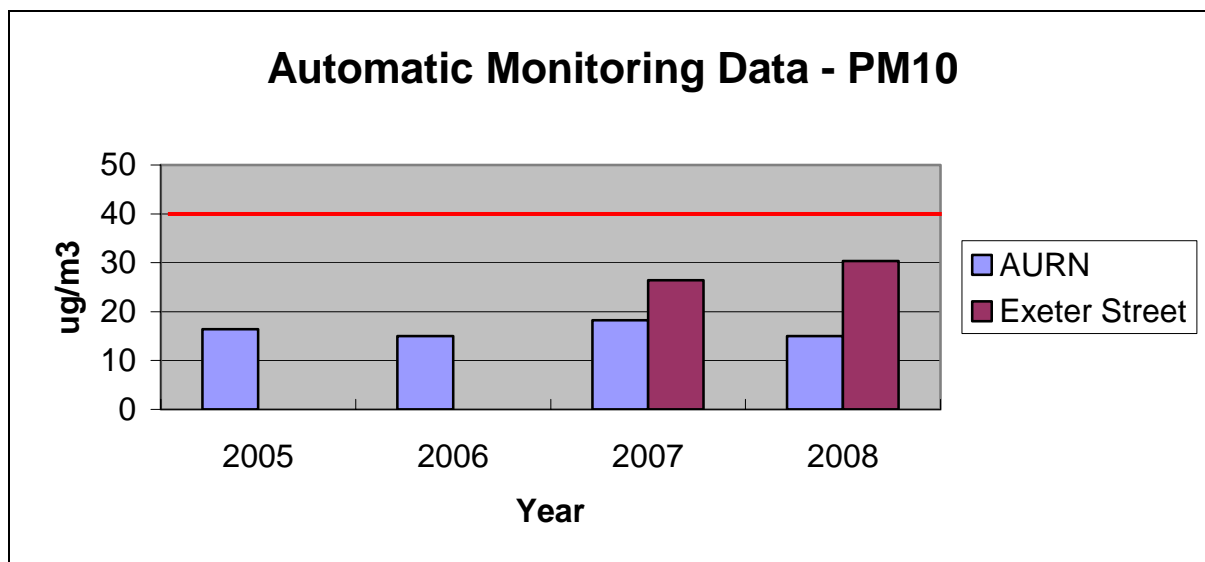


Figure 2.10 Results of PM₁₀ Automatic Monitoring: Comparison with Annual Mean Objective

Location	Within AQMA?	Data Capture 2008 %	Number of Exceedances of hourly mean (50 µg/m ³) <i>If data capture < 90%, include the 90th percentile of hourly means in brackets.</i>			
			2005	2006	2007	2008
Armada Way	N	74	0	0	0	0
Exeter Street	Y	100	-	-	8	10

Table 2.12 Results of PM₁₀ Automatic Monitoring: Comparison with 24-hour Mean Objective

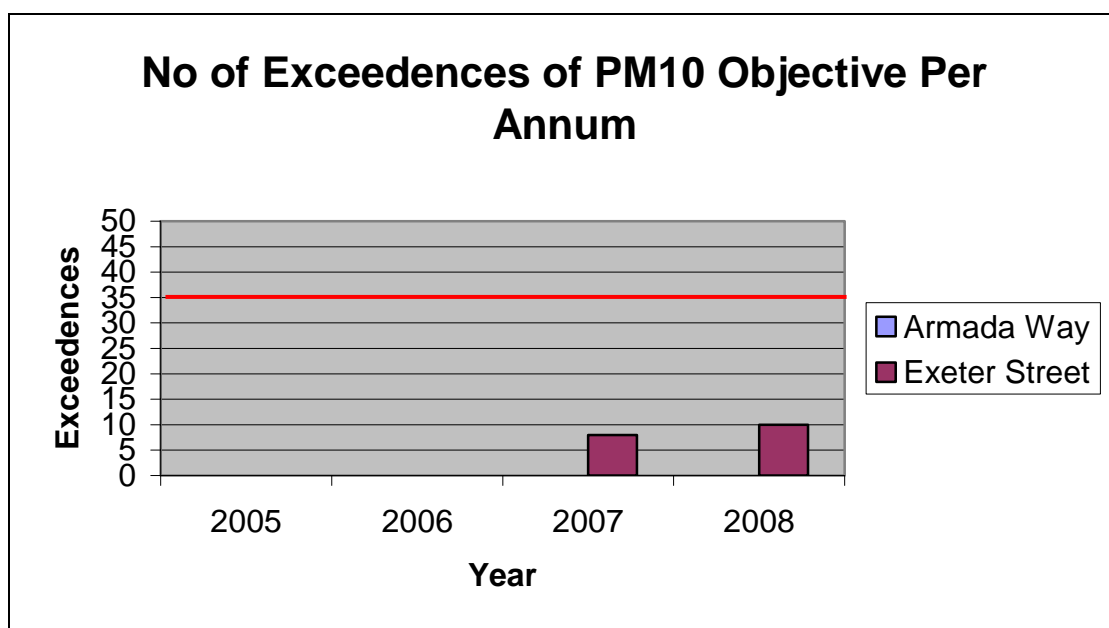


Figure 2.11 Number of exceedences of PM₁₀ objective per annum

The data above clearly shows that there is no evidence the objectives are being exceeded at either of the locations, and there is no clear trend evident in the annual average concentrations, therefore no further assessment is required.

3.3 Benzene

3.3.1 Automatic Monitoring Data

The 2008 and previous years' monitoring results back to 2004 obtained from pumped Benzene sampling carried out at the Plymouth Centre AURN and within the AQMA are shown in Table 2.13 below. All information relating to Benzene is the subject of a separate Detailed Assessment submitted to DEFRA.

Site ID	Location	Within AQMA?	Proportion of year with valid data 2008 %	Annual mean concentrations ($\mu\text{g}/\text{m}^3$)				
				2004	2005	2006	2007	2008*
E	School Pumped Sampler	Y	100 %	1.17	2.84	2.7	1.71	1.71 *
F	AURN Pumped Sampler	N	91 %	-	1.09	0.92	1.04	0.58

Table 2.13 Results of Automatic Monitoring data for Benzene

3.3.2 Non Automatic Monitoring Data

The 2008 and previous years' monitoring results back to 2004 obtained from the passive sampling programme carried out at the Plymouth Centre AURN and within the AQMA are shown in Table 2.14 below. Details of co-location and bias adjustment factors are in Appendix 1.

Site ID	Location	Within AQMA?	Proportion of year with valid data 2008 %	Annual mean concentrations ($\mu\text{g}/\text{m}^3$)				
				2004	2005	2006	2007	2008*
A	School Wall	Y	100 %	3.06	3.06	3.01	1.36	1.47
B	School Door	Y	100 %	2.39	2	2.35	1.12	1.15
C	St Theresa's House	Y	100 %	5.53	4.35	3.84	2.22	2.09
D	Exeter Street Flats	N	100 %	2.28	1.41	2.18	1.01	1.28
G	AURN Roof Tube	N	83.4%	0.94	0.75	0.95	0.67	0.57

Table 2.14 Results of Benzene Diffusion Tubes, 2004 to 2008

The results for pumped sampler and diffusion tube monitoring carried out in 2008 are shown below in Figure 2.12

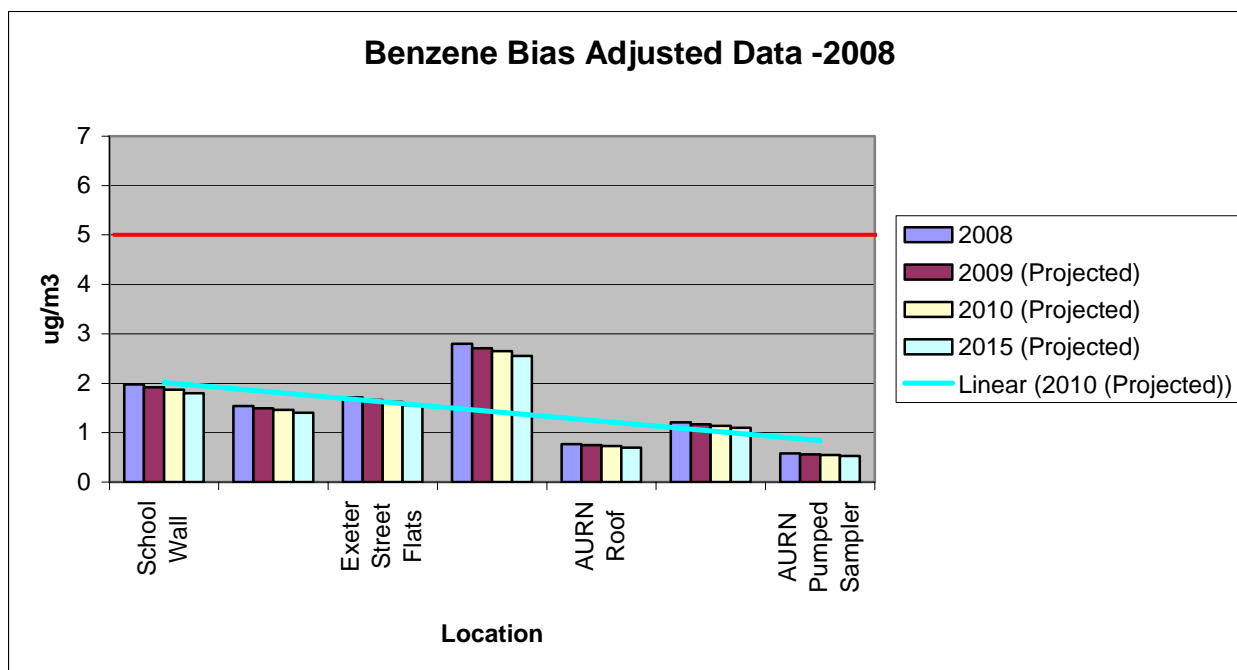


Figure 2.12 Benzene 2008 Bias Adjusted Data

The Benzene information relating to AQMA is subject to a separate Detailed Assessment.

3.4 Other Pollutants

3.4.1 Carbon Monoxide

Only monitoring data collected at roadside sites needs to be considered for review and assessment of Carbon Monoxide (CO). Plymouth City Council does not independently monitor for CO and monitoring was discontinued at the Plymouth Centre AURN in September 2007, therefore no automatic monitoring data within the City is available for carbon monoxide since then. Data obtained from www.airquality.co.uk show that the maximum 8-hour mean CO concentrations for 1999 to 2007 are all well below the 10mg/m³ objective. This is clearly shown in Figure 2.13 below.

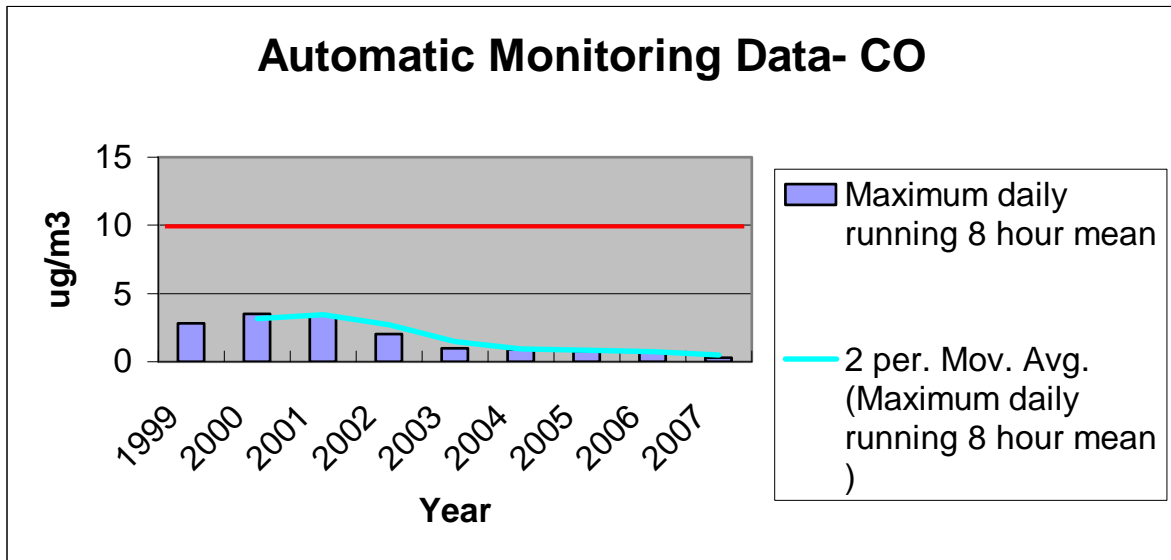


Figure 2.13 Plymouth Centre AURN CO Concentrations 1999-2007

3.4.2 Sulphur Dioxide

Plymouth City Council does not independently monitor for Sulphur Dioxide (SO₂) and monitoring was discontinued at the Plymouth Centre AURN in September 2007, therefore no automatic monitoring data within the City is available for the pollutant since then.

Data from obtained from www.airquality.co.uk show that there have been no exceedances of the 2005 15 minute average in any year of monitoring. Figure 2.14 below shows recent trend data prior to the analysers' removal.

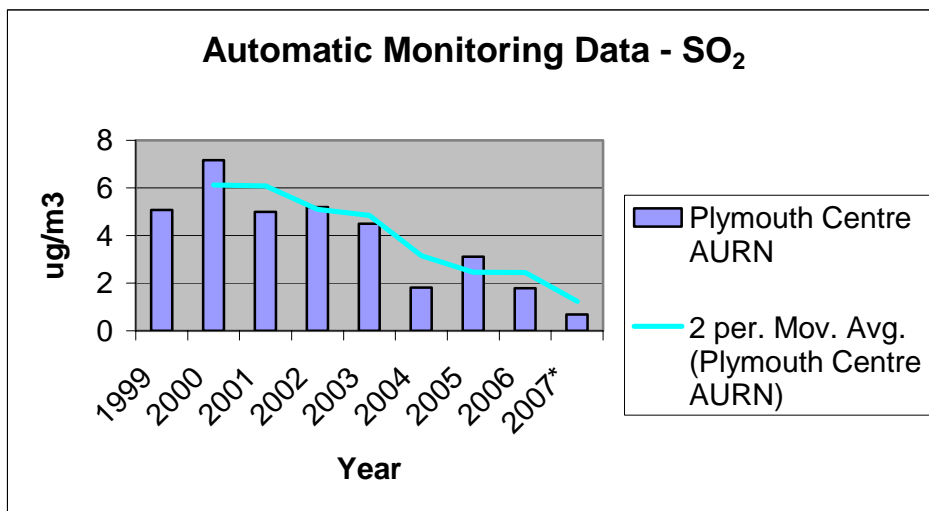


Figure 2.14 Plymouth Centre AURN Annual Mean SO₂ Concentrations 1999-2007

3.4.3 1, 3 Butadiene

Plymouth City Council does not monitor 1, 3 butadiene concentrations. However, maximum running annual mean concentrations of 1, 3 butadiene measured at all urban background/centre and roadside locations nationally are well below the 2003 objective of 2.25 $\mu\text{g}/\text{m}^3$.

In addition, previous studies undertaken for this pollutant at a national level, based on both measured and modeling data, suggest that there is little likelihood of the objective for 1, 3-butadiene being exceeded after 2003.

3.4.4 Lead

Lead (Pb) concentrations are not monitored by Plymouth City Council; however, the nearest monitoring location was a roadside site in Cardiff. The most current data obtained from that site and all other background and roadside UK national network monitoring sites show that Pb concentrations are well below the objective for 2008, as shown in Figure 2.15 below.

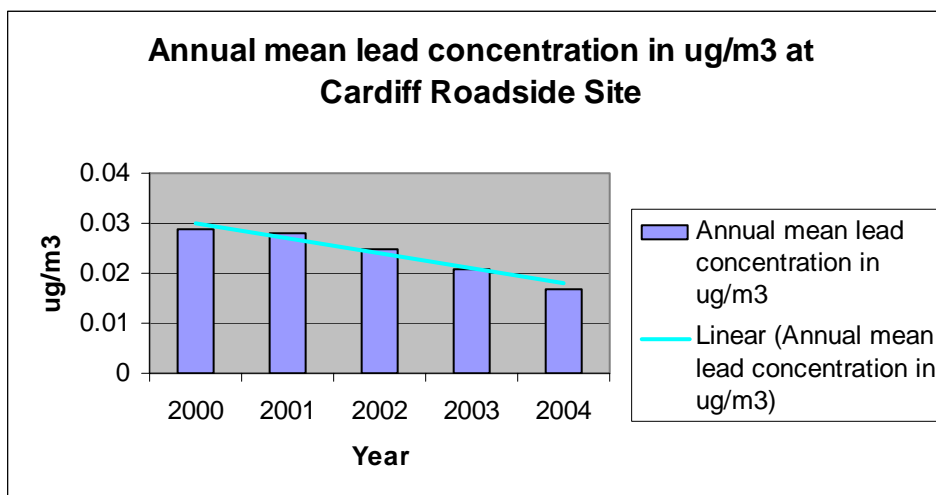


Figure 2.15 Cardiff Roadside Lead Annual Mean Concentrations 2000-04

4 Road Traffic Sources

4.1 Narrow Congested Streets with Residential Properties Close to the Kerb

Any potential locations with narrow congested streets with relevant exposure within 2m of the kerb have been assessed during previous rounds of the review and assessment process. The location that was identified as being a potential problem now forms part of the Exeter Street AQMA. Since there are no further locations there is no need to proceed further with this section.

Plymouth City Council confirms that there are no new/newly identified congested streets with a flow above 5,000 vehicles per day and residential properties close to the kerb, that have not been adequately considered in previous rounds of Review and Assessment.

4.2 Busy Streets Where People May Spend 1-hour or More Close to Traffic

These types of locations were considered in previous rounds of the review and assessment process and from local knowledge it was determined that there were no streets in Plymouth where this would apply. Having once again considered the criteria, there are still no busy streets where people spend 1-hour or more close to traffic within Plymouth. Both AQMAs have been assessed and as all levels are below $60\mu\text{g}/\text{m}^3$, it is unlikely that the one-hour mean would be breached. This is confirmed by monitoring data.

Plymouth City Council confirms that there are no new/newly identified busy streets where people may spend 1 hour or more close to traffic.

4.3 Roads with a High Flow of Buses and/or HGVs.

From analysis of recent traffic data provided by the transport department and local knowledge it has been determined that there are no streets in Plymouth where this would apply. Consequently, no further consideration of this part is required.

Plymouth City Council confirms that there are no new/newly identified roads with high flows of buses/HGVs.

4.4 Junctions

There are a number of junctions within Plymouth that have been considered during previous rounds of the review and assessment process. From local knowledge and data provided by the transport department there are no further junctions that need consideration. Therefore there is no need to proceed further with this section.

Plymouth City Council confirms that there are no new/newly identified busy junctions/busy roads.

4.5 New Roads Constructed or Proposed Since the Last Round of Review and Assessment

Having consulted PCC's Transport and Planning Departments there have been no new road links that have been constructed or proposed since the previous round of the review and assessment. The proposed new town at Sherford to the east of the city has not yet progressed past the outline planning stage and therefore there is no need to proceed further with this section.

There have been no new roads constructed or proposed since the previous round of the review and assessment. Therefore there is no need to proceed further with this section.

Plymouth City Council confirms that there are no new/proposed roads.

4.5 Roads with Significantly Changed Traffic Flows

Having consulted PCC's Transport Department and analysed traffic data since the last USA, there have been no roads within Plymouth area with an increase of traffic flow of more than 25%. The levels are approximately increasing between 1 and 2% per annum.

Plymouth City Council confirms that there are no new/newly identified roads with significantly changed traffic flows.

4.7 Bus and Coach Stations

There are two bus stations within Plymouth, both of which were considered during the first round of the Updating and Screening process. Confirmation has been received from the two bus companies that serve Plymouth that the bus movements are still below 1000 movements per day and there is no relevant exposure within 10m. Therefore there is no need to proceed further with this section.

Plymouth City Council confirms that there are no relevant bus stations in the Local Authority area.

5 Other Transport Sources

5.1 Airports

Table 4.1 below shows the background concentrations for NO_x, NO₂ and PM₁₀ derived from NETCEN (2006) for the 1 km x 1 km grid covering the airport.

Year	Background Concentrations (µg/m ³)		
	NO _x	NO ₂	PM ₁₀
2007	18.2	15.5	17.9
2008	17.1	14.5	18.0
2010	16.6	13.0	17.1
2013	15.3	12.0	16.7

Table 4.1: Background concentrations at Plymouth Airport (predicted to 2013)

Plymouth's airport is located at Roborough, about 5 miles north of Plymouth on the A386 road to Tavistock and was considered during the initial updating and screening assessment in 2003. The nearest sensitive premises are residential properties located on Tavistock Road and Plymbridge Road. The nearest properties on Tavistock Road are located 450m south west of the runway and properties located 350m north of the runway. In 2007 there were only 88,139 passengers, 4648 commercial movements and 13,902 other movements at Plymouth Airport. These figures have not increased to any significant extent and with the loss of one of the airlines, Airwales; the predicted annual throughput is well below 5 million passengers per year. The maximum 2008 background concentrations NO_x at the corresponding grid reference of the airport (SX 502 602) is 16.48ug/m³

A planning application has been submitted by the operators and leaseholders of the airport to decommission runway 06/24 and the 06/24 approach and to relocate airport infrastructure. On the land that is released by the above de-commissioning and relocations, the creation of a mixed use development on land to the south west of the existing terminal and a separate, principally residential, development on 06/24 Approach is proposed.

The Environmental Impact Assessment undertaken to support the application concludes that there will be no significant adverse affect on air quality in the area. This will be discussed in future reports should the development progress further.

Plymouth City Council confirms that there are no airports in the Local Authority area that meet the criteria.

5.2 Railways (Diesel and Steam Trains)

5.2.1 Stationary Trains

This section was covered in the 2003 USA. It was found that the procedures for trains remaining at the station for more than 15 minutes required them to turn their engines off and if necessary connect to a shore supply. There has been no change in the train service and no new areas where it is considered likely that there will be any regular exposure to members of the public within 15m of the stationary locomotives. Consequently there is no need to proceed with this section further.

Plymouth City Council confirms that there are no locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.

5.2.2 Moving Trains

Plymouth does not have any direct link or suffer any adverse impact from the rail traffic that serves the rail lines identified in Table 5.1 of the LAQM TG (09); therefore there is no need to proceed with this section further.

Plymouth City Council confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.

5.3 Ports (Shipping)

There are three main shipping areas within Plymouth. Commercial ships are located to the eastern side of Plymouth, in the Cattewater area, ferries are located 4.5 kms away to the south of Plymouth at Millbay Docks and naval ships are a further 1.5 kms away to the west at Devonport Dockyard.

Emissions from shipping movements (either sailing in or out of dock) from these areas were assessed in previous rounds of the review and assessment process.

Each of the three areas is within 1km of relevant locations. However, the three shipping areas are located some distance from each other and combined effects of the shipping movements were not considered to be significant.

Contact was made with the Queens Harbour Master to determine the number of shipping movements in a year at each area. There are less than 5000 movements per annum at the Environmental Protection and Monitoring Unit

two birthing areas at the Cattewater and Millbay Docks however there are over 5000 movements of naval shipping at for Devonport Naval Base per annum.

The shipping emissions from the above areas of the Plymouth Harbour were factored in previous reports; no exceedance of the SO₂ AQO was predicted. There have been no significant changes in the number of shipping movements and no new areas of relevant exposure; therefore there is no need to proceed further with this section.

Plymouth City Council confirms that there are no ports or shipping that meets the specified criteria within the Local Authority area.

6 Industrial Sources

6.1 Industrial Installations

6.1.1 New or Proposed Installations for which an Air Quality Assessment has been carried out

A full list of the industrial processes permitted by Plymouth City Council is included in Appendix 9, page 55.

All industrial sources were assessed as part of previous review and assessment, and it was concluded there were no Part A or B processes in the Plymouth area or surrounding Districts emitting significant quantities of Benzene, Butadiene or Lead. Since the last USA, the Langage Power Station has been constructed by Centrica, owners of the site. The gas-fired power station which is an 885MW plant was expected to start generating in late 2008. However the commissioning dates have been put back and it is thought that the power station will become operational mid 2009.

Langage is the first new power station to be built in the UK for over 5 years and was constructed to fill the projected 'energy gap' in UK generating capacity, caused by the expected closure of nuclear and older coal fired stations. The power station has been built within a neighbouring district to Plymouth, being South Hams District Council with permission to use heavy distillate fuel oil in the event of interruption of the fuel supply for a maximum of 240 hours per annum. The installation has an A1 Permit issued by the Environment Agency.

The site lies around 550 metres from residents of Plymouth. The A1 permit requires that the flue gases will be discharged via a multi-flued stack, being a maximum of 65 metres high, above a stack base elevation of 90 metres. Various scenarios have been modeled, in which some circumstances may lead to a breach of the EA guidance note H1 however; this is based on highly unlikely situations using fuel oil in excess of 250 hours per annum. Due to the predominant wind direction and nature of the terrain, the location of the maximum annual average of NO₂ is to the north-east and at a distance of less than 3km from the stack, which is in the opposite direction to the Plymouth boundary. In conclusion, the maximum long term concentration of NO₂ due to the plant emissions are a small percentage of the long term NO₂ objective, and are just above the target threshold of 0.4µg/m³. However, this is based on absolute maximum operation and therefore the predictions are overestimates. The maximum short-term concentrations of NO₂ are well below the air quality objectives in all locations and will therefore never generate in isolation an exceedance of these standards.

Discussions with South Hams District Council have established that the modeling carried out to support the application stage for the power plant is still applicable and therefore there is no need to look at this any further at this stage.

South Hams District Council will undertake targeted monitoring exercise for NO₂ when the power station is commissioned. This will include monitoring at several properties within the Plymouth boundary. These results will be reported in later reports.

Plymouth City Council has assessed new/proposed industrial installations, and concluded that it will not be necessary to proceed to a Detailed Assessment.

6.1.2 Existing Installations where Emissions have increased Substantially or New Relevant Exposure has been Introduced

Following approach 2 in section C1 of Box 5.5 of the LAQM TG (09) there have been no existing industrial sources identified where emissions have increased substantially or new relevant exposure has been introduced

It is evident that the majority of permitted installations, for example vehicle refinishers and factories that are permitted under the Environmental Permitting (England and Wales) Regulations 2007 (EPR) and the Solvent Emissions Directive have vastly reduced their emissions to air to comply with ever stricter permit conditions.

Plymouth City Council confirms that there are no industrial installations with substantially increased emissions or new relevant exposure in their vicinity within its area or nearby in a neighbouring authority.

6.1.3 New or Significantly Changed Installations with No Previous Air Quality Assessment

Fine Tubes have a Part A2 and Part B Permit for the surface treatment of metal, which results in the release into air of acid forming oxides of nitrogen. The Part A2 was granted since the last USA in 2006. Reference was made to Appendix E of LAQM.TG (03), which stated that this will not have any impact on emissions of the air quality strategy pollutants and as such it has been regarded as insignificant. There have been no other new sources developed, and there have been no significant changes to existing processes, therefore it will not be necessary to proceed to a detailed assessment.

Plymouth City Council has assessed new/proposed industrial installations, and concluded that it will not be necessary to proceed to a Detailed Assessment.

6.2 Major Fuel (Petrol) Storage Depots

The 2003 USA identified two petrol storage terminals in Plymouth, Chevron (formerly Shell) and the Mayflower Terminal (formerly Esso), which required further examination. Both are Part B permitted processes under the Environmental Permitting Regulations 2007.

The closest receptors to the petrol storage terminals were found to be 88 metres away and both are located 1471 metres and 835 metres south east of the Benzene AQMA. The USA concluded that the emissions of Benzene from the storage terminal would have no significant effect on the concentrations of Benzene within the AQMA.

There has been no change to this situation and therefore it will not be necessary to proceed to a Detailed Assessment.

There are major fuel (petrol) storage depots within the Local Authority area, but these have been considered in previous reports.

6.3 Petrol Stations

Permits issued by the Council under the Pollution Prevention and Control Regulations for petrol vapour recovery required all petrol stations with a petrol throughput of greater than 1000 m³/annum to fit Stage 1 vapour recovery before 1st January 1999. Information on those petrol stations with throughputs greater than 1000 m³/annum is therefore available and these were listed in the previous USA.

With regards to the existing AQMA for Benzene declared in May 2005, due to evaporative emissions of Benzene, continued monitoring data has shown a steady reduction of Benzene concentrations from 2003 to 2008 and that that no exceedances of the 2010 objective are predicted at relevant receptor locations for future years, and none have been recorded since the AQMA was declared in 2005. This will be discussed in a separate Detailed Assessment.

Analysis of all petrol stations permitted under the Environmental Permitting Regulations 1997 has shown that there are no new petrol stations identified with an annual throughput of more than 2 million litres, next to a road with a flow of more than 30,000 vehicles per day, and within 10 metres of any residential properties.

There are no new petrol stations within the Local Authority area meeting the specified criteria.

6.4 Poultry Farms

There are no poultry farms in located within Plymouth or close by in surrounding districts where it is thought likely that emissions of PM₁₀ could contribute to exceedances of the PM₁₀ objectives.

Plymouth City Council confirms that there are no poultry farms meeting the specified criteria.

7 Commercial and Domestic Sources

7.1 Biomass Combustion – Individual Installations

In January 2008, an application was received to develop and operate a 'Timber Resources Recovery Centre' which was to be located in a predominantly industrial area to the north of the city. The aim was to recover and recycle more than 95% of the waste timber product received (classed as biomass fuel) as feedstock in the form of Renewable Electricity, Heat and Carbon. The throughput of the proposed facility was approximately 3 tons per hour or 250kg per hour of timber product per gasifier. This application was rejected at the initial planning stage and no further applications have been received to date.

There have been no other applications submitted under the Environmental Permitting Regulations 1997, the Planning Regime or Building Regulations for any plants burning biomass in 50kw to 20MW units and are no known existing boilers meeting this criteria within Plymouth, therefore there is no need to proceed further with this section.

Plymouth City Council confirms that there are no biomass combustion plants in the Local Authority area.

7.2 Biomass Combustion – Combined Impacts

There have been no applications under the Environmental Permitting Regulations 1997, the Planning Regime or Building regulations for any plants burning biomass in 50kw to 20MW units and are no known existing boilers meeting this criteria within Plymouth, therefore there is no need to proceed further with this section.

Plymouth City Council confirms that there are no biomass combustion plants in the Local Authority area.

7.3 Domestic Solid-Fuel Burning

For the USA 2003 a comprehensive investigation was carried out over a 500m x 500m area where significant coal burning still takes place. The results showed that there were less than 100 houses using wood or coal as their main fuel.

From professional judgement, there would appear to be no new areas within Plymouth where there would be a significant amount of properties using coal as their main source of fuel.

There are no smoke control areas and no areas where significant complaints are generated from with regard to smoke.

There is no evidence to suggest that exposure to PM₁₀ or Sulphur Dioxide, arising from domestic coal burning has increased since they were considered as part of the 2003 USA therefore no further assessment is required.

Plymouth City Council confirms that there are no areas of significant domestic fuel use in the Local Authority area.

8 Fugitive or Uncontrolled Sources

For the purpose of this USA, all the Part A and Part B installations, controlled under the regulatory regimes of the Environmental Permitting (England and Wales) Regulations 1997, in the vicinity of Plymouth were reviewed using data from the relevant public registers.

A number of source types can give rise to significant fugitive emissions. For the purpose of the update and screening assessment; the focus should be on quarrying and mineral extraction sites, landfill sites, materials handling activities, major construction sites and waste management sites.

There have been no new fugitive or uncontrolled sources identified during the assessment or no significant increase in existing sources identified in previous round of review and assessment and therefore no further assessment is required.

Plymouth City Council confirms that there are no potential sources of fugitive particulate matter emissions in the Local Authority area.

9 Conclusions and Proposed Actions

9.1 Conclusions from New Monitoring Data

The conclusions for individual pollutants are provided below.

9.1.1 Nitrogen Dioxide

In 2005 Plymouth City Council declared two AQMA's at Exeter Street and Mutley Plain on the basis that the NO₂ concentrations in these areas would not meet the relevant objective. During the course of this study, new monitoring data has been examined which has determined that these AQMA's are still valid.

The USA has identified that the air quality objective for NO₂, (annual mean) is likely to be exceeded at three new locations with relevant public exposure.

Therefore, Plymouth City Council has proceeded to detailed assessments of NO₂ for the locations identified in the report, to determine whether or not the objective is likely to be achieved. These reports have been submitted to DEFRA in April 2009.

9.1.2 Benzene

The results from the last three years of monitoring have demonstrated that Benzene concentrations have dropped considerably within the AQMA and that there will be no predicted exceedances of the 2010 objective.

The fall in concentrations can be attributed to the natural drop in background concentrations, newer car fleets with catalytic converters and the retrofitting of abatement technology (stage 2 vapour recovery) at the petrol station in January 2007.

Benzene concentrations may vary significantly from one year to the next, due in to the influence of meteorological conditions; however, the concentrations are predicted to continue to fall nationally and locally due to the continued reductions in background concentrations and improvements in vehicle emissions through the implementation of national policies.

A detailed assessment has been submitted to DEFRA in April 2009 in that provides the necessary information to support the conclusion that the AQMA declared for Benzene, (on the basis that the potential for the 2010 objective to be exceeded is not likely) should be revoked.

9.1.3 Carbon Monoxide

The 2009 USA for CO₂ in Plymouth confirms that the 2005 AQO for CO₂ are continuing to be met and that emissions of this pollutant predominantly from the inefficient combustion of fuel of road traffic will not cause a breach of the AQO, therefore, no further assessment is required.

9.1.4 Sulphur Dioxide

The 2009 USA for SO₂ in Plymouth confirms that the 2005 AQO for SO₂ are continuing to be met and that emissions of this pollutant from railways (diesel and steam trains), shipping and domestic fuel burning will not cause a breach of the AQO, therefore, no further assessment is required.

9.1.5 1, 3 Butadiene

The 2009 USA for 1, 3 Butadiene in Plymouth confirms that the 2003 AQO for this pollutant are continuing to be met and that emissions of this pollutant from industrial installations will not cause a breach of the AQO, therefore, no further assessment is required.

9.1.6 Lead

The 2009 USA for lead in Plymouth confirms that the 2008 AQO for this pollutant are continuing to be met and that emissions of this pollutant from industrial installations will not cause a breach of the AQO, therefore, no further assessment is required.

9.1.7 PM₁₀

Monitoring of PM₁₀ is carried out as part of the automatic monitoring network as an urban background site, using a TEOM/FDMS and independently in Exeter Street. The annual mean concentrations for both sites were below the objective of 20µg/m³.and there were no exceedances of the 24-hour mean of 50µg/m³.

The 2009 USA for PM₁₀ in Plymouth confirms that the 2004 AQO for this pollutant are continuing to be met and that the emissions of this pollutant from industrial sources, uncontrolled fugitive emissions, biomass combustion and road traffic will not cause a breach of the AQO, therefore, no further assessment is required.

9.2 Conclusions from Assessment of Sources

The 2009 USA was carried out according to 'Local Air Quality Management Technical Guidance' LAQM. TG (09). It has indicated that all the air quality objectives listed in Table 1.1 will meet or are continuing to meet the relevant deadlines, with the exception of NO₂ where existing exceedances of the 2005 objective continue and new areas of exceedance have been identified.

9.3 Proposed Actions

Having undertaken the USA and coming to the conclusions above, Plymouth City Council has undertaken the following actions.

- 1 A Detailed Assessment of NO₂ has been submitted for the three new locations identified in the report to determine whether or not the objective is likely to be achieved and the conclusions in that report will be to declare three new AQMAs for NO₂
- 2 Plymouth City Council will also undertake to review all current monitoring locations and programmes and will develop a long term strategy for air quality monitoring in the City
3. A Detailed Assessment for Benzene has been submitted with a full appraisal and review of all the monitoring data to support Plymouth City Council's opinion that the AQMA for Benzene should be revoked on the basis that no exceedances of the 2010 objective are predicted at relevant receptor locations.

10 References

1. Part IV of the Environment Act 1995 Local Air Quality Management. Technical Guidance LAQM.TG (09) (2009) Technical Guidance (The Stationary Office Limited)
2. Part IV of the Environment Act 1995 Local Air Quality Management. Policy Guidance LAQM.PG(03), February 2003 (The Stationary Office Limited)
3. Updating and Screening Assessment Report 2003, May 2003 (Plymouth City Council)
4. Updating and Screening Assessment Report, 2006 (Plymouth City Council)

Appendices

Appendix 1:

QA/QC Data

Nitrogen Dioxide Diffusion Tubes

Where NO₂ is monitored using diffusion tubes, the standard method recommended by NETCEN and the analytical laboratory undertaking analysis (Gradko) is followed. Gradko are a fully accredited establishment and supply tubes to many local authorities.

NO₂ diffusion tubes are clear plastic tubes, with one open end and a closed end containing a NO₂ absorbing chemical matrix (triethanoamine). The types of tubes used are 20% TEA in water. The open end is sealed with a plastic cap before it is transported to the monitoring location. At the site the cap is removed and the tube is mounted vertically with the open end at the bottom. The interval between preparation and deployment is kept to a minimum. During storage the tubes are kept in a sealed plastic bag in the refrigerator. A blank tube is sent which remains in the sealed bag during the monitoring period and is returned with the rest of the tubes to the laboratory for analysis.

Monitoring sites were identified upon relevant exposure or those that were considered to be representative of a relevant exposure location. The tubes were mounted mostly on drainpipes. Ideally, the tubes should be mounted on to spacer blocks and not attached directly to any surface. Tubes, however, are prone to theft and are, therefore, attached using strong tape above head height. The tubes are exposed for a period of four weeks and the exposure time noted in hours.

Quality assurance is given by participation in the Working Sampling Proficiency Programme (WASP). These tests provide a regular independent check on the calibration. The analytical lab used was Gradko International Ltd., St Martins House, 77 Wales Street, Winchester, Hampshire SO23 0RH.

Benzene Diffusion Tubes

Benzene diffusion tubes are supplied by Gradko. Analysis is carried out using gas chromatography / thermal desorption techniques. Standard solutions are prepared covering the concentration range 10-2000ng and there is an uptake rate of 1.28ng per ppm per minute. The exposed tubes are thermally desorbed and the vapour phase transferred to a gas chromatography system. Calibration determinations are made for every batch of tubes analysed. Results are issued in parts per billion and are then converted to µg/m³. The interval between preparation and deployment is kept to a minimum and after tubes are

dispatched they are stored within the refrigerator until deployment to site. A control tube is left unexposed in the refrigerator for the exposure period and returned with the tubes after exposure. Monitoring locations have been chosen to represent relevant exposure locations to represent the annual mean concentration, although the accuracy of the tubes may be +/- 25%. When the tubes are placed out at the monitoring locations, the red cap is removed and a filter is placed on the end of the tube. The tubes are left for 4 weeks and when collected, the filter is removed and the cap is placed on the tube. The tubes are then sent away to the laboratory for analysis.

Quality assurance is given by the participation in the WASP scheme. The analytical laboratory takes part in the Workplace Analysis Scheme for Proficiency (WASP) run by the UK Health and Safety Laboratories. Samples of BTEX loaded tubes are sent to each laboratory three times per year for analysis. The laboratory methods and procedures used for this analysis form part of the Quality Management Systems which has been written to comply with the requirement of UKAS.

Pumped Benzene Diffusion Tubes.

The National Physics Laboratory co-ordinate a national survey, that Plymouth participates in. The pumped sampler for the national survey is located at the AURN site, in Armada Way, and is considered an urban background site. Benzene tubes are provided fortnightly and the local site operator changes the tubes, checks and adjusts the flow rate accordingly. All procedures in the manual provided by NPL are followed.

NPL audit the sampler every six months to check that the box is not leaking, measure the flow through the two tubes and correct it if it is more than 10% out. If the flow is greater than 10% out then the data is scaled accordingly. The absorbent is carbopack x. The uptake rate does not apply due to it being a pumped sampler. The second NPL sampler installed at Holy Cross School is exactly the same equipment as above. All procedures are followed in an identical manner, and are analysed in the same way.

AURN Network

Monitoring data obtained from Plymouth City Council's automatic monitoring site in Armada Way is affiliated to the DEFRA's AURN network. As such it follows all QA/QC procedures set out in the local site operators' manual. Daily internal calibrations are conducted as well as fortnightly calibrations to check equipment performance and internal instrument parameters. Provisionally scaled data is available on the internet. Performance audits and inter calibrations are additionally conducted by agencies appointed by the DEFRA. The data is ratified every 6 months by NETCEN, and is reported every 6 months in the QA/QC Data Ratification Report for the Automatic Urban Network. This is, a report produced for the

Department for Environment, Food and Rural Affairs, Scottish Executive, Welsh Assembly Government and the DoE in Northern Ireland.

NO₂ Chemiluminescent Monitor

Monitoring for Oxides of Nitrogen is carried out at Mutley Plain and Exeter Street by continuous analysers. These analysers are not linked to any particular network. The data obtained from the analysers is stored on secure servers at Air Monitors head office. The data can be accessed at any time through a license key held by the Public Protection Service. The data is examined for any spurious results or anomalies, and these are removed. The results have been averaged over 24 hours and calculated as monthly mean figures.

Routine site visits are carried out to maximise data capture and integrity of data. These operations include:-

- Ensuring the proper running of the equipment
- Performing instrument calibrations and diagnostic checks
- Minimising instrument down time by anticipating problems prior to them occurring
- Carrying out essential routine functions such as filter changes
- Performing checks of the automatic calibration system.

To enable the data to be scaled, it is necessary to calibrate the equipment using a gas mixture of known concentration. Calibrations are conducted automatically daily. These are carried out in accordance with the manual provided by the manufacturer.

An ongoing maintenance contract is in place with Air Monitors, the supplier of the equipment, who attend the sites every six months to service the equipment. The service contract also covers emergency attendance at the sites in the event of any breakdown or failure of equipment.

Appendix 2

Factor from Local Co-location Studies (if available)

It was not possible to work out a bias adjustment factor for 2008 due to the poor data capture from both the Plymouth Centre AURN site and the tri-located diffusion tubes. The poor data capture rate was due to the removal of analysers from the AURN for site upgrading and dangerous state of the AURN roof resulting on a ban access due to health and safety reasons.

AEA Energy & Environment
From the AEA group

Checking Precision and Accuracy of Triplicate Tubes

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	15/01/08	12/2/2008	33.6	36.1	36.9	36	1.7	5	4.3	29.52	100	Good	Good
2	12/2/2008	11/3/2008	33.2	37.9	32.4	34	2.9	9	7.3	31.75	100	Good	Good
3	11/3/2008	8/4/2008	21.8	21.1	22.0	22	0.5	2	1.2	21.04	70	Good	Good
4	8/4/2008	8/5/2008	31.1	27.2	29.5	29	2.0	7	4.8	24.52	100	Good	Good
5	8/5/2008	5/6/2008								23	100		Good
6	5/6/2008	3/7/2008								13	100		Good
7	3/7/2008	29/07/2008	21.2	16.6	20.3	19	2.5	13	6.1	13	100	Good	Good
8	29/07/2008	26/08/08								13	100		Good
9	26/08/08	23/09/08	13.7	13.5		14	0.2	1	1.5	22	100	Good	Good
10	23/09/08	21/10/08								25	100		Good
11													
12													
13													

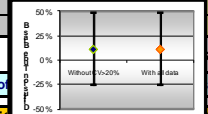
It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Site Name/ ID: Plymouth Centre

Precision: 6 out of 10

Accuracy (with 95% confidence interval) without periods with CV larger than 20%
 Bias calculated using 5 periods of data
 Bias factor A: 0.91 (0.68 - 1.37)
 Bias B: 10% (-27% - 46%)
 Diffusion Tubes Mean: 26 μgm^{-3}
 Mean CV (Precision): 7
 Automatic Mean: 24 μgm^{-3}
 Data Capture for periods used: 100%
 Adjusted Tubes Mean: 24 (18 - 36) μgm^{-3}

Accuracy (with ALL DATA)
 Bias calculated using 5 periods of data
 Bias factor A: 0.91 (0.68 - 1.37)
 Bias B: 10% (-27% - 46%)
 Diffusion Tubes Mean: 26 μgm^{-3}
 Mean CV (Precision): 7
 Automatic Mean: 24 μgm^{-3}
 Data Capture for periods used: 100%
 Adjusted Tubes Mean: 24 (18 - 36) μgm^{-3}



all survey --> Precision 20%

(Check average CV & DC from Accuracy calculations)

Without CV>20%: 11%
 With all data: 11%

36.7% 36.7%

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 Version 03 - November 2006

Appendix 3

Discussion of Choice of Factor to Use

Due to the poor data capture rate all NO₂ diffusion tubes were bias adjusted using the national bias adjustment figure of 0.92. It is interesting to note that the BAF worked out with available data was 0.91 showing a good correlation between the two.

The trend in bias adjustment factors for the last seven years is shown in table below.

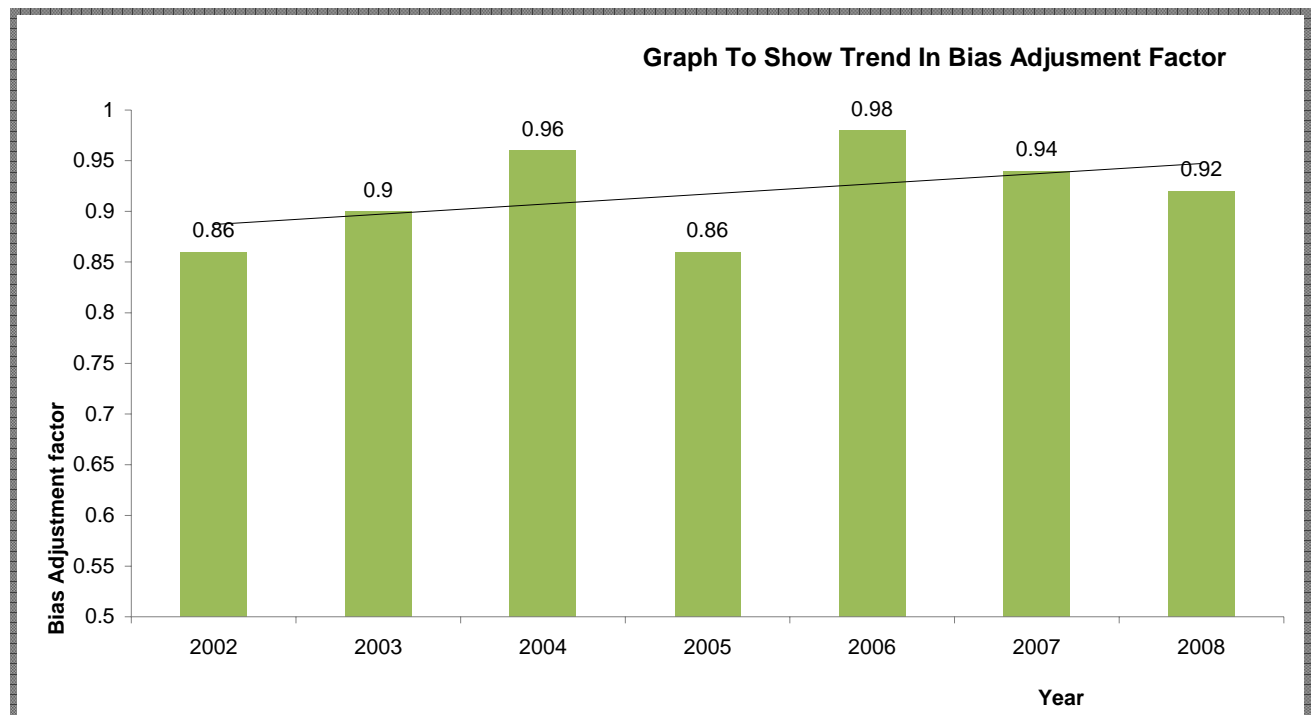


Table showing trend in Bias Adjustment Factors

Appendix 4

PM Monitoring Adjustment

The Plymouth Centre AURN and PCC's independent PM₁₀ monitoring sites are equipped with Tapered Element Oscillating Microbalance systems (TEOMs) that have been retrofitted and upgraded with Filter Dynamics Systems (FDMS). These upgraded TEOMs meet the equivalence criteria as described in Table 3.4 of the Technical Guidance LAQM TG (09) and therefore there is no need to apply a default correction value or adjust the values using the Volatile Correction Model.

Appendix 5

Short-term to Long-term Data adjustment

Where only short term-periods of monitoring data are available the Technical Guidance LAQM TG (09) suggests that an estimated annual mean is calculated using box 3.2.

To estimate an annual mean monitoring data above 75% from an AURN background site is required. Ideally two to four AURN sites data are required for the calculation however; the nearest site to the Plymouth is in Exeter which is a roadside site and 50 miles away.

The data capture rate for the Plymouth Centre AURN site was at 85% and the data capture rate for Plymouths two independent NO₂ analysers were both at 100%. However only the Plymouth Centre AURN data could be used as both other sites are road-side locations.

The estimation of the annual mean from short-term monitoring data was disregarded due to the adjustment factor being over two providing spurious results. Therefore to present the worst the scenario raw data has been used.

Appendix 6: DMRB Calculations

The Highway Agency's DMRB model provided on the LAQM Tools website are used together with background pollution levels from the National Archive to predict NO₂ levels from the traffic data. However, those areas that have exceeded or are predicted to exceed the NO₂ AQO have been modeled with Aaquire 6.1.1. from Faber Maunsell.

The model predicts no exceedances of the NO₂ annual average objective for the three new areas however the model outputs are known to under estimate pollutant concentrations. The three areas identified in this screening process Royal Parade, Stoke Village and Tavistock Road, requires further 'Detailed Assessments' for NO₂, which have been submitted in conjunction with this USA. The modeling exercises and results carried out for these three areas have been described in more detail in the Detailed Assessment

Appendix 7

Maps of Locations

Maps of all monitoring locations are contained in the main report. Detailed maps of the three new areas of exceedance are provided in the separate Detailed Assessment.

The table below provides details of all the NO₂ monitoring locations.

Tube No	Location	Site Type	Map Reference	Eastings	Northings
1	Control/Blank				
2	St.Catherines House	Roadside	SX 4754 SE	247617	54262
3	81a to 85a Vauxhall Street	Roadside	SX 4854 SW	248239	54290
4	Mariners Court	Roadside	SX4854 NW	248488	54527
5	Charles Cross	Roadside	SX 4854 NW	248246	54644
6	Exeter Street Flats (103-111)	Roadside	SX 4854 NE	248586	54526
7	4 St Judes Road	Roadside	SX 4854 SE	248841	54458
8	11 Tothill Road	Roadside	SX 4854 SE	248923	54470
9	212a Exeter Street	Roadside	SX 4854 SE	248942	54385
10	48 Embankment Road	Roadside	SX 4954 SW	249211	54435
11	211 Embankment Road	Roadside	SX 4954 NE	249752	54610
12	Portakabin depot Embankment Road	Roadside	SX 5055 SW	250307	55273
13	2 Woodford Avenue	Roadside	SX 5256 NW	252285	56713
14	422 Tavistock Road "Garfield"	Roadside	SX 5060 NW	250072	60991
15	45 Tavistock Road	Roadside	SX 4858 SW	248440	58412
16	203 Crownhill Road	Roadside	SX 4759 SW	247293	59137
17	Outland Road	Roadside	SX 4757 SE	247716	57301
18	161 Molesworth Road	Roadside	SX 4655 NW	246206	55815
19	Pennycomequick flats (1-23)	Roadside	SX 4755 SW	247343	55315
20	Caprera Place	Roadside	SX 4755 SE	247658	55194
21	2 Hyde Park Road	Roadside	SX 4856 SW	248309	56028
22	Connells Mutley Plain	Roadside	SX 4856 SW	248404	56039
23	6 Alexandra Place Greenbank Rd	Roadside	SX 4855 NW	248352	55853
24	140 North Hill	Roadside	SX 4855 NW	248415	55528
25	14a Mutley Plain	Roadside	SX 855 NW	248401	55173
26	22 Mutley Plain (Con Club)	Roadside	SX 4855 NW	248392	55669
27	Mutley Plain (shop)	Roadside	SX 4855 NW	248352	55853
28	28 Oxford Place	Roadside	SX 4754 NE	247628	54948
29	Coburg Street	Roadside	SX 4754 NE	247816	54927
30	Royal Parade	Roadside	SX 4754 SE	247710	54479
31	A.U.N.	Background	SX 4754 NE	247751	54605
32	A.U.N.	Background	SX 4754 NE	247751	54605
33	A.U.N.	Background	SX 4754 NE	247751	54605
34	Milehouse Road (Staton Creaber)	Roadside	SX 4655 NW	246219	55833
35	12 Devonport Road (Traffic lights)	Roadside	SX 4655 NW	246162	55761
26	Morshead Road (Small post by No 8)	Roadside	SX 4858 SW	248477	58481
37	Great Berry Road	Roadside	SX 4858 SW	248445	58326
38	Royal Parade (Lampost by banks)	Roadside	SX 4754 SE	247976	54483
39	Derrys Cross roundabout (Halifax)	Roadside	SX 4754 SW	247454	54449
40	15 Devonport Road	Roadside	SX 4655 NW	246173	55755
41	Nomony Childrens Centre	Roadside	SX4954SW	249049	54236
42	East End Resource Centre	Roadside	SX4954SW	249027	54317
43	68 Mainstone Avenue	Roadside	SX4954SW	249374	54271
44	7a River View	Roadside	SX4954SE	249610	54332
45	8a River View	Roadside	SX4954SE	249553	54322
1A	1 Woolverwood Lane Roadside	Roadside	SX5655SW	256050	55500
2A	Deep lane	Roadside	SX5655SW	256175	55409
3A	Roseveare Close	Roadside	SX5253NW	252481	53581
4A	Woodland Close	Roadside	SX5253NW	252478	53616
5A	164 Elburton Road	Kerbside	SX5153NE	251749	53785
6A	Hillside Crescent	kerbside	SX5153NE	251769	53805
7A	Horn lane	Background	SX5152NE	251590	52887
8A	Colesdown Hill	Background	SX5254SW	252272	54215
9A	114 Billacombe Road	Roadside	SX5153NW	251387	53935
10A	70 Billacombe Road	Roadside	SX5054SE	250980	54015
	Mutley Plain NO2 Analyser	Roadside	SX4855 NW	248385	55815
	Exeter Street NO2 & FDMS Analyser	Roadside	SX 4854 NE	248576	54533
	Alma Road (to be installed)	Roadside	SX4755SW	247309	55423
	Royal Parade (to be installed)	Roadside	SX4754SE	247685	54476
	Tavistock Road (to be installed)	Roadside	SX4848NW	248480	58504



Appendix 8		2008 (RAW DATA)		End Dates (4 Week Exposure Period)												Mean	Bias Adj
Tube No	Location	15/01/08	12/02/08	11/03/08	08/04/08	08/05/08	08/06/08	01/07/08	29/08/08	26/07/08	23/09/08	21/10/08	18/11/08	16/12/08			
1	Control	0	0	0	0	0	0	0	0	0	0	0	0	0			
2	St Catherine's House	31.37	41.02	46.95	40.17	40.2	44.62	30.34	30.00	3.93	22.50	38.28	37.42	missing	33.9	31.19	
3	81a to 85a Vauxhall Street	34.58	43.01	45.79	31.25	41.79	33.71	29.98	32.83	30.69	27.57	41.03	42.97	39.69	36.5	33.61	
4	Mariners Court	32.24	missing	missing	35.88	27.49	34.49	24.91	20.90	19.50	18.15	39.51	33.83	50.29	30.7	28.20	
5	Charles Cross	45.8	50.79	52.99	25.37	50.41	52.41	27.05	36.22	36.25	38.68	45.52	45.54	52.14	43.0	39.57	
6	Exeter Street (flats)	37.91	47.95	51.32	29.61	51.1	63.21	28.40	8.48	31.34	20.19	51.38	39.22	43.8	38.8	35.66	
7	4 St Judes Road	37.21	41.87	missing	28.7	33.18	49.00	29.58	32.01	31.93	22.54	38.86	38.64	40.87	35.4	32.54	
8	11 Tothill Road	33.71	41.13	39.05	28.7	36.26	37.17	28.16	27.77	27.97	16.44	39.83	34.93	37.96	33.0	30.37	
9	212a Exeter Street	33.88	45.51	47.81	31.59	43.55	51.59	36.18	missing	74.60	22.64	46.81	40.25	47.09	43.5	39.98	
10	48 Embankment Road	45.58	51.53	58.06	41.14	52.64	53.71	39.08	33.65	38.48	31.66	49.17	44.48	49.83	45.3	41.68	
11	211 Embankment Rd	42.64	47.27	50.63	28.93	37.22	63.23	39.85	38.78	29.40	31.99	46.32	42.43	55.01	42.6	39.19	
12	Portakabin Depot	37.03	39.6	35.02	31.3	42.22	40.30	28.28	29.24	28.62	24.28	33.59	30.24	39.87	33.8	31.11	
13	2 Woodford Avenue	31.31	43.18	33.64	23.9	37.59	30.30	26.11	29.26	26.65	17.25	31.08	34.45	30.22	30.4	27.95	
14	422 Tavistock Road	34.93	48.18	39.57	37.86	missing	32.26	missing	34.73	41.35	26.95	miss	47.19	47.63	39.1	35.94	
15	45 Tavistock Road	51.11	59.77	58.76	47.41	48.39	51.23	41.39	missing	37.20	26.07	54.18	51.98	60.54	49.0	45.08	
16	203 Crownhill Road	LOD	54.77	missing	42.55	20.68	21.64	41.71	17.29	17.87	8.70	22.46	25.87	27.13	27.3	25.15	
17	Outland Road	34.46	50.39	44.07	32.89	34.83	32.55	18.03	32.01	30.00	26.97	39.14	44.66	46.42	35.9	33.01	
18	161 Molesworth Road	47.67	lod	45	44.13	39.83	39.78	29.94	39.16	39.28	34.19	48.25	57.31	54.53	43.3	39.80	
19	Pennycomequick	17.47	46.53	45.85	32.32	37.38	37.73	39.85	21.22	27.71	16.52	36.90	38.52	46.14	34.2	31.43	
20	Capra place	36.68	missing	missing	30.34	30.79	46.28	22.28	29.12	28.52	missing	miss	miss	42.49	33.3	30.65	
21	2 - Hyde Park Rd	39.14	42.72	41.13	28.03	38.60	42.70	29.22	27.43	20.78	26.51	37.10	43.22	56.43	36.4	33.47	
22	Connells	38.85	48.75	41.01	32.38	40.41	33.37	35.80	37.74	41.91	26.43	missing	45.04	missing	38.3	35.27	
23	6 Alexandra Place	33.41	39.66	missing	33.73	35.36	39.31	39.06	27.23	27.51	18.53	44.82	45.56	58.94	36.9	33.97	
24	140 North Hill	32.13	40.17	35.71	23.62	50.14	27.23	32.03	27.85	27.89	15.92	38.60	30.02	40.87	32.5	29.88	
25	14a Mutley plain	54.15	58.63	55.3	51.19	52.48	41.77	50.07	46.85	45.88	38.92	4.47	58.66	missing	46.5	42.81	
26	22 Mutley Plain	43.87	62.84	59.22	53	46.26	43.82	53.64	45.78		25.59	55.49	50.86	62.77	50.3	46.24	
27	Mutley Plain	53.33	65.45	61.06	37.12	42.75	47.99	57.97	38.92	35.88	37.70	61.62	48.25	65.29	50.4	46.41	
28	Cobourg Street	38.85	47.95	44.58	36.39	34.99	40.92	29.60	22.64	25.27	25.55	41.69	47.15	59.44	38.1	35.03	
29	28 Oxford Street	27.81	missing	39.05	missing	missing	38.96	34.55	missing	missing	missing	40.49	25.19	40.87	34.7	31.89	
30	Royal Parade	50.88	missing	68.43	44.13	missing	59.11	57.43	missing	46.74	missing	missing	missing	75.9	57.5	52.92	
31	AUN 1	33.88	33.58	33.18	21.81	31.05	missing	missing	21.18	missing	13.70	missing	missing	missing	26.9	24.76	
32	AUN 2	31.08	36.13	37.85	21.13	27.17	missing	missing	16.56	missing	13.46	missing	missing	missing	26.2	24.10	
33	AUN 3	20.56	36.93	32.43	22.04	29.46	missing	missing	20.33	missing	missing	missing	missing	missing	27.0	24.80	
34	Milehouse Rd	47.61	61.81	missing	50.4	51.10	56.45	40.63	30.76	46.42	28.24	45.42	missing	19.09	43.4	39.97	
35	Devonport Road	39.96	49.6	46.31	35.88	37.33	39.31	31.02	25.79	28.05	19.55	39.69	39.45	53.22	37.3	34.33	



36	Morshead Road	46.85	48.69	missing	21.58	44.66	29.52	42.99	34.01	missing	47.05	54.65	54.06	53.3	43.4	39.93
37	Great Berry Rd	48.95	55.98	48.5	52.32	52.06	33.67	56.61	51.16	47.17	35.15	58.56	60.96	60.16	50.9	46.80
38	Royal Parade	45.39	missing	missing	69.61	67.00	61.05	56.21	49.97	0.20	45.56	64.93	50.76	67.88	52.6	48.39
39	Derry's Cross	71.03	63.63	73.85	35.71	49.66	61.48	58.66	46.44	49.57	48.13	66.54	54.83	77.31	58.2	53.56
40	15 Devonport Rd	33.18	56.08	47.87	missing	48.12	44.55	29.92	24.87	33.71	missing	47.41	36.32	48.99	41.0	37.72
41	Nomony Children's Centre											60.22	56.67	58.88	58.6	53.90
42	East End Resource Centre											40.43	37.42	45.1	41.0	37.70
43	68 Mainstone Avenue											35.41	41.17	49.03	41.9	38.52
44	7a River View											45.68	missing	missing	45.7	42.03
45	8a River View											36.68	41.39	44.2	40.8	37.50
1A	1 Wolverwood Lane	38.86	27.98	39.92	missing	33.50	36.28	18.43	12.95	14.06	23.44	30.96	28.74	38.86	39.2	36.09
2A	Deep Lane Roadside	40.91	45.60	47.06	20.17	40.90	28.56	30.16	36.10	35.49	19.11	44.54	47.09	40.91	40.1	36.89
3A	Roseveare Close	30.52	20.88	32.83	missing	19.54	23.94	13.60	10.27	10.47	13.28	18.47	24.02	30.52	40.2	37.02
4A	Woodland Close	28.56	25.45	26.38	14.69	20.45	15.60	14.90	missing	13.40	9.71	19.67	22.56	28.56	40.3	37.09
5A	164 Elburton Road	45.82	38.30	40.15	32.77	34.41	31.85	24.37	missing	missing	21.26	34.65	37.62	45.82	40.5	37.29
6A	Hillside Crescent	36.78	31.98	32.6	20.51	29.45	35.94	17.47	15.46	16.18	11.43	25.99	30.60	36.78	40.5	37.24
7A	Horn Lane	28.48	19.05	23.33	15.65	16.52	15.30	10.77	10.69	missing	12.37	16.62	17.11	28.48	40.5	37.28
8A	Colesdown Hill	21.38	17.25	22.52	12.09	12.25	13.18	7.68	9.18	6.96	6.28	14.22	19.23	21.38	40.6	37.38
9A	114 Billacombe Road	33.65	32.47	34.91	22.66	25.12	9.16	23.40	22.68	21.42	16.46	23.92	26.65	33.65	40.8	37.54
10A	70 Billacombe Road	32.45	25.94	31.45	15.37	21.42	21.80	16.68	9.12	15.26	12.47	21.22	13.58	32.45	40.7	37.48



Appendix 9

Permitted Industrial Processes in Plymouth

Permit Number	Issue Date	Operator	Address of Installation	Industry/Sector	Process Guidance Note
A1 (Authorised by The Environment Agency)					
EA/PPC/VP3734SY	12/12/2003	Viridor	Derriford Hospital, Derriford, PL6 8HD	Incineration	
		Silicon Sensing Products (UK LTD)	Unit 18, Estover Road, PL6 7PY	Hydrogen Fluoride	
		Vapour Management Systems Ltd	85 St Modwen Road, Parkway Industrial Estate, PL8 8LH	Halogens	
A2 (Authorised by Plymouth City Council)					
LAIPPC/A2/J11PL2175P/1/01	11/17/2004	Fine Tubes Ltd	Plymbridge Road Estover, Plymouth PL6 7LG	Degreasing of Metal	SG 6 (04)
LAIPPC/A2/104**WALL/1/01	3/18/2005	Interfish Ltd	Wallsend Industrial Estate, Cattedown road, PL4 0RW	Rendering of Fish Offal	SG 8 (04)
Part B (Authorised by Plymouth City Council)					
EP/B/G10S10EFFF0/1/01	7/24/2009	Efford Crematorium	Efford Road, Efford PL3 6NG	Crematoria	PG 5/2 (04)
EP/B/B03S18FERN/2/01	7/24/2009	Weston Mill Crematorium	Ferndale Road, Weston Mill PL2 2EP	Crematoria	PG 5/2 (04)
LAPPC/B/F07W**BREA/ 1/ 01	15 th August 2005	SGS Strath Services Ltd	Mayflower Terminal, Breakwater Hill, Coxside PL4 0RJ	Petrol Terminal	Process Guidance Note 1/3 (04)



LAPPC/B/F07WA1OAKF/ 1/ 01	15 th August 2005	Texaco Ltd	Oakfield Terrace Road, Cattedown PL4 0RY	Petrol Terminal	Process Guidance Note 1/3 (04)
LAPPC/J05PG5ELBU/1/01	19/03/2004	Aggregate Ind	Moorcroft Quarry, Elburton Road PL9 8AJ	Quarry Process	PG 3/8 (96)
LAPPC/J05P**ELBU/1/01	19/03/2004	Ashcroft	Moorcroft Quarry, Elburton Road PL9 8AJ	Mobile Crusher	PG 3/16 (96)
LAPPC/JB/P**HAYE/1/02	02/03/2007	CEMEX	Moorcroft Quarry, Elburton Road PL9 8AJ	Cement Batching	PG 3/01 (04)
LAPPC/JBPA1EMBA/1/02	21/03/2007	Glendinning	Embankment Rd, Laira PL4 9JL	Cement Batching	PG 3/01 (04)
EP/B/J041**10sh/1/01	24/07/2008	Hanson Aggregates	10 Shapters Way, Cattedown PL4 0RU	Cement Batching	PG 3/01 (04)
LAPPC/ J13P**ROCK/ 2/ 02	19/03/2004	Tarmac	Rock Gardens, Billacombe Rd, PL9 7HY	Cement Batching	PG 3/01 (04)
LAPPC/B/V085**1013/2/01	19/03/2004	Curtis Ball	10/13 Manor St, Stonehouse PL1 3NF	Waste Oil Burner	PG1/1 (04)
LAPPC/B/V08S**4LIS/1/02	17/03/2007	Exway Coachworks	4 Lister Close, Newnham Industrial Estate, PL7 4BA	Vehicle Spraying	PG 6/34b (06)
LAPPC/B/V08R0512LI/1/02	23/03/2007	Ocean	12 Lister Close, Newnham Industrial Estate, PL7 4BA	Vehicle Spraying	PG 6/34b (06)
LAPPC/B/V01R**LONG/2/02	27/03/2007	Vospers	Longbridge Road, Marsh Mills, PL6 78AY	Vehicle Spraying	PG 6/34b (06)
LAPPC/B/V08V361MIL/1/02	27/03/2007	Plymouth CityBus	1 Milehouse Road, Milehouse, PL3 4AA	Vehicle Spraying	PG 6/34b (06)



LAPPC/B/V08V**FARA/1/02	27/03/2007	Rodgman & Williams	Faraday Mill Business Pk, Prince Rock, PL4 0ST	Vehicle Spraying	PG 6/34b (06)
LAPPC/B/V08V**3STR/1/ 02	27/03/2007	Hall, Graves & Lee	3 Strode Road, Plympton, PL7 4AY	Vehicle Spraying	PG 6/34b (06)
LAPPC/B/V08V33BROX/1/02	27/03/2007	Nationwide	Pomphlett Farm Industrial Estate, Broxton Drive, PL9 7LG	Vehicle Spraying	PG 6/34b (06)
LAPPC/B/CO4R14PLY/3/02	30/04/2007	The Barden Corporation	Plymbridge Road, Estover PL6 7LH	Surface Cleaning of Metal	PG 6/45 (04)
LAPPC/B/J08P02PENN/1/01	11/03/2005	Hellermann Tyton	Pennycross Close, Pennycross PL2 3NX	Adhesive Coating	PG 6/32 (04)
LAPPC/B/J11P2485AS/1/01	30/04/2007	Interlube	85a St Modwen Road, Marsh Mills PL6 8LH	Surface Cleaning of Metal	PG 6/45 (04)
LAPPC/B/JO2P13ERNE/1/01	11/03/2005	Kawasaki	Ernesettle Lane, Ernesettle PL5 2SA	Coating of Metal	PG 6/23 (04)
LAPPC/B/J11PL2175P/ 1/01	17/11/2004	Fine Tubes	Plymbridge Road, Estover PL6 7LG	Metal Treatment	PG 4/1 (05)
LAPPC/B/J12P**COYP/2/01	16/03/2005	Princess Yachts International PLC	Coypool Road, Marsh Mills, PL7 4NW	Coating of Wood	PG 6/33 (04)
LAPPC/B/J12P**COYP/ 3/ 01	25/11/2005	Princess Yachts International PLC	Coypool Road, Marsh Mills, PL7 4NW	Fibre Reinforced Plastics	PG 4/02 (05)
LAPPC/B/J12P**COYP/ 1/ 01	19/03/2004	Princess Yachts International PLC	Coypool Road, Marsh Mills, PL7 4NW	Manufacture of Timber and Wood- Based Products	PG 6/02 (04)



LAPPC/B/V085**1013/2/01	19/03/2004	Curtis Ball	10/13 Manor St, Stonehouse PL1 3NF	Waste Oil Burner	PG1/1 (04)
LM/TC/003/06	31 st March 2007	Smart Service Station	Budshead Road, PL6 5DY	Petrol Station	Process Guidance Note 1/14 (06)
LM/TC/009/06	31 st March 2007	Honicknowle Service Station	Crownhill Road, PL5 3SL	Petrol Station	Process Guidance Note 1/14 (06)
LM/TC/010/06	31 st March 2007	Milehouse Service Station	23 Wolseley Road, PL2 3AA	Petrol Station	Process Guidance Note 1/14 (06)
LM/TC/023/06	31 st March 2007	Weston Mill Filling Station	Wolseley Road, PL5 1BL	Petrol Station	Process Guidance Note 1/14 (06)
LM/TC/001/06	31 st March 2007	ASDA Filling Station	Leypark Drive	Petrol Station	Process Guidance Note 1/14 (06)
LM/TC/015/06	31 st March 2007	Morrison's Petrol Filling Station	Pomphlett Mill Quarry	Petrol Station	Process Guidance Note 1/14 (06)
LM/TC/016/06	31 st March 2007	Sainsbury Petrol Filling Station	Plymouth Road	Petrol Station	Process Guidance Note 1/14 (06)
LM/TC/017/06	31 st March 2007	Somerfield Petrol Filling Station	150 Plymouth Road	Petrol Station	Process Guidance Note 1/14 (06)
LM/TC/020/06	31 st March 2007	Tesco Petrol Filling Station	2 Woolwell Crescent	Petrol Station	Process Guidance Note 1/14 (06)
LM/TC/022/06	31 st March 2007	Vale Petrol Station	Alexandra Road, Plymouth	Petrol Station	Process Guidance Note 1/14 (06)



LM/TC/004/06	31 st March 2007	Chaddlewood Garage Filling Station	251 Ridgeway, PL7 1AJ	Petrol Station	Process Guidance Note 1/14 (06)
LM/TC/012/06	31 st March 2007	Pace Service Station	243 Mannamead Road, PL3 5RJ	Petrol Station	Process Guidance Note 1/3 (04)
LM/TC/005/06	31 st March 2007	Commercial Service Station	9-11 Chapel Street, PL1 4DP	Petrol Station	Process Guidance Note 1/3 (04)
LM/TC/018/06	31 st March 2007	Tesco Express	137 Eggbuckland Road, PL3 5JU	Petrol Station	Process Guidance Note 1/14 (06)
LM/TC/013/06	31 st March 2007	Pace Service Station	Plymouth Road, PL3 6EE	Petrol Station	Process Guidance Note 1/14 (06)
LM/TC/011/06	31 st March 2007	Morley Service Station	6 Billacombe Road, PL9 7HP	Petrol Station	Process Guidance Note 1/14 (06)
LM/TC/019/06	31 st March 2007	Tesco Filling Station	Transit Way, PL5 3TW	Petrol Station	Process Guidance Note 1/14 (06)
LM/TC/006/06	31 st March 2007	Exeter Street Service Station	77-81 Exeter Street, PL4 0AH	Petrol Station	Process Guidance Note 1/14 (06)
LM/TC/014/06	31 st March 2007	PACE Service Station	Wolseley Road, PL5 1UD	Petrol Station	Process Guidance Note 1/14 (06)
LM/TC/02/06	31 st March 2007	Total UK Ltd	Forder Valley Road, PL6 8LE	Petrol Station	Process Guidance Note 1/14 (06)
LM/TC/002/06	31 st March 2007	Smart Service Station	443 Tavistock Road PL6 8HE	Petrol Station	Process Guidance Note 1/14 (06)



LM/TC/008/06	31 st March 2007	Home Park Filling Station	89 Outland Road	Petrol Station	Process Guidance Note 1/14 (06)
LAPPC/B/B01510PLYM/1/01	31 st October 2007	Timpson Ltd C/o J Sainsbury's	Plymouth Road Crabtree Plymouth PL3 6RL	Dry Cleaners	Process Guidance Note 6/46(04)